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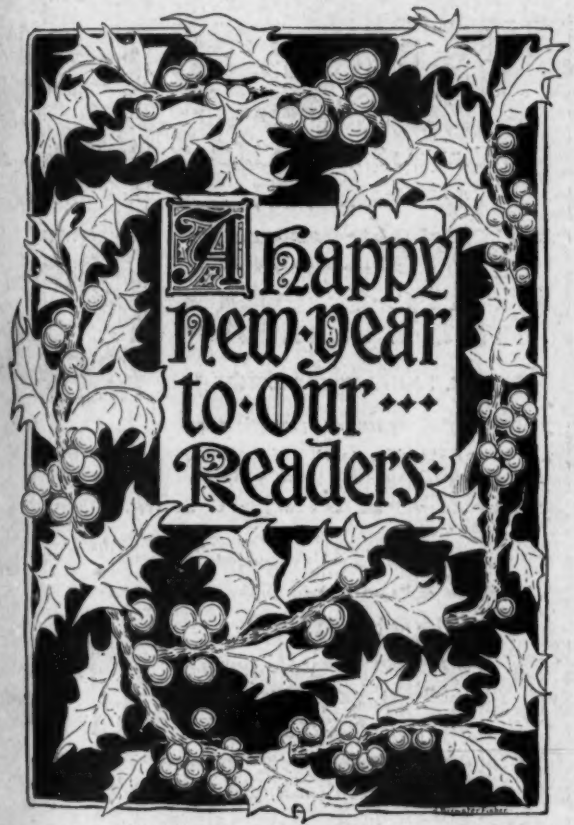

CONTENTS

OF THE

JANUARY NUMBER.

EDUCATION IN PARLIAMENT, 1902: A FORECAST 333
BY MANY HANDS 335
WITH OUR CHILDREN 338
N.U.T. NOTES 339
NOTES FROM THE NORTH 340
COLLECTIVE EXAMINATION OF PUPIL TEACHERS 340
ON "GENERAL INFORMATION" FOR THE KING'S SCHOLARSHIP 341
JENA AND ITS HOLIDAY COURSES 342
THE SCHOOL OF GEOGRAPHY AT OXFORD. By JOAN BERENICE REYNOLDS, B.A. 346
NOTES AND JOTTINGS 347
NATURE-KNOWLEDGE. By JAMES KNIGHT, M.A., B.Sc. 348
GENERAL PHYSICAL GEOGRAPHY. By A. J. HERBERTSON, PH.D. 349
OUR ILLUSTRATED GEOGRAPHICAL NOTEBOOK 351
HOW TO COMPILE NOTES OF LESSONS. By T. HUDSON, Head-Master of Kepler Board School, Leeds 352
A COURSE OF OBJECT LESSONS FOR GIRLS' SCHOOLS. By WILLIAM DONE, B.A. 353
THE INSPECTOR'S NOTEBOOK 354
OUR MODEL INFANTS' SCHOOLS 357
ELEMENTS OF READING. By C. M. A. COOMBS, L.L.A. 358
AT OUR INFANTS' DEPARTMENTS 360
A SONG FOR THE INFANTS' SCHOOL: THE BIRDIE'S NEST 362
OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE. By A. T. FLUX 363
NOTES ON "QUENTIN DURWARD" 368
OUR CERTIFICATE COURSE FOR 1902. By G. COLLAR, B.Sc. 369
LONDON MATRICULATION. By C. J. PHILLIPS, M.A. 372
OUR QUERY COLUMN 374
PHYSIOGRAPHY 377
CHEMISTRY 378
ELECTRICITY AND MAGNETISM 379
THEORETICAL MECHANICS 380
THE EDITOR'S TABLE 381

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EDUCATION IN PARLIAMENT, 1902: A FORECAST.

"JANUARY brings the snow," the school-book jingle taught us *memoriter*. January is to bring the opening of Parliament and "a frost," perhaps, for education.

January the sixteenth—nearly a month earlier than the usual day. What does such alacrity portend? What chances for the schools in this predated session? Is the "big Bill," that educationists look for, to make his obeisance to Big Ben? Or will the session peter out (in Yankee phrase), with hardly an Education Bill at all?

And what about the Teachers' Appeal against Dismissal Bill? Is it to see the light this year?

* * *

A fool can put questions: it takes a wise man to answer them, says the proverbial philosophy of nations, the "wisdom of many and the wit of one." And your wise man declines to risk the fate of prophets, which is to get stoned. Yet the problem fascinates; we hanker about its premises, and peer through the door ajar. What, what behind that door is being devised by the Great, Wise, and Eminent who consent to manage our national affairs for us? Is it a cockboat or a cruiser that lies on the stocks in Whitehall?

* * *

According to hypercritical chronologists, the twentieth century really did not begin till 1902, and I very much doubt that even then a new century will begin for education. Consider the tall programme of non-educational Bills already announced. Mr. Walter Long, turning from muzzles to mains, from hydrophobia to water, promises a London Water Bill that will be no chicken. Mr. Chamberlain announces an overhauling of the Rules of the House of Commons to check Hibernian loquacity. Mr. Ritchie "hopes to introduce a considerable measure of temperance reform:" there will be cross-currents, of water and beer, to puzzle the navigation of that Bill. The Home Secretary—sanguine man!—promises a Coal Mines Bill also, and a Bill for Prison Reform. Then the House of Commons will wag its beard over the cost of the war, the drop in Consols, the decline in trade; and possibly there may be peace proposals to wrangle over, and cross-currents there again. Also, the Chancellor of the Exchequer will present his little bill, and the House will groan as again it dips its hand into its pocket.

* * *

Debates "in Supply" will be long and angry. There *must* be Supplementary Estimates and Votes on Account. The mere fact that Parliament is to gather so early, before the Court is out of mourning again—so that the King must open the session with "maimed rites," and the peeresses not in the full glory of gay apparel—may stand as proof that the Chancellor's exchequer is nearly empty. Yes, financial debates must occupy the session up to Easter, or near it, as was the case last year. Then there is something more than mere gossip about the rumours of Lord Salisbury's retirement; and the contest for his succession in the Premiership may bring about internecine ructions for the party in power. Anxious as it has so often shown itself for education, *can* that party find time for a big Education Bill?

* * *

The Coronation itself will be no child's play: the Abbey is to be shut to worshippers for three months, so that the carpenters may hammer to their hearts' content; and there may be a similar surcease of Parliament, though not for so long. And even if there is not, what about the batch of little Departmental Bills that each Minister will politely introduce to the Cabinet? Some of these have been introduced there before; some of them are getting positively hoary in their hope deferred; some of them have been postponed again and again, till they can be postponed no longer. The Education Bill will have to battle for a place with these.

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Nevertheless, a leading ministerial organ of the press is quite sure that a big Education Bill there is to be. This newspaper came out, so early as the beginning of December, with a flaring line on its placard, "*Legislation for next Session*," and printed in bold type, in a prominent column, the assertion that "Sir John Gorst is busily engaged in the preparation of the Education Bill, and there is reason to believe that its main outlines are virtually settled."

I rather fancy Sir John Gorst sent that *on dit* to that alert newspaper himself; no minister knows better how to advertise than he. And if he did, then the importance of the *communique* is so patent that I had better quote it in full, much as I dislike to pad my manuscript with citations from other pens—even from Sir John's!

So now to copy the *on dit* from that especially well-informed ministerial newspaper:—

"Sir John Gorst is busily engaged in the preparation of the Education Bill, and there is reason to believe that its main outlines are virtually settled. There is, however, one matter over which serious controversy arises, and it is quite possible that there may be a considerable division of opinion in the Cabinet over it. It is very generally understood that the Church party throughout the country are solid on the question of rate-aid for the Voluntary schools, and that they are not prepared to rest satisfied with the present grant-in-aid from imperial funds. It is unnecessary to point out that this raises a question full of dangers and difficulties to the progress of any Education Bill, and it is not easy to see how Sir John Gorst will be able to grapple with it."

Sir John Gorst, you see—not the Duke of Devonshire; the Duke never advertises, and the advertiser ignores the Duke. It is all Sir John, that knight Falstaffian, with his intolerable deal of sack and mere ha'porth of bread in education. I have not finished the quotation from the ministerial organ; I merely pause, to point out the significance of it so far. I take it to convey a broad hint to the clergy and the clerical laymen that they had better be circumspect in grasping at the nuts within the narrow-necked jar. "Be good, boys, or you'll get nothing," is the hint veiled in the cryptogram. But it goes on to foreshadow how much they may get, if circumstances favour Sir John Gorst's supernumerary wise and beneficent efforts for the schools.

For note: "There possibly may be something in the suggestion that if the supervision of all elementary, secondary, and technical schools is, under the Bill, given to local authorities, they may with equal propriety be intrusted with the power to determine to what schools within their jurisdiction rate-aid shall be given. Whatever their decision on this point may be, it is plain that the Government will get into sad trouble with their best supporters in the country if they do not make a bold and resolute effort to pass an Education Act."

Which, being interpreted, may mean that Sir John Gorst's plan is to set up a new local authority, and give it leave to decide whether Voluntary schools in its district shall, or shall not, get rate-aid; and if they shall, on what terms they shall, and on what conditions. Now the Joint Committee of the Convocations of Canterbury and York proposed in November that the Voluntary schools should get rate-aid in the same ratio as the Board schools; and as the right to teach dogmas and catechisms in rate-aided Voluntary schools shall be claimed, so also shall be claimed an extension of that right to Board schools as well.

The last is an inept proposal; it ties up two incongruous things together, presents to Parliament two problems at once, and doubles the difficulties for a Bill. As if the placing of the Voluntary schools in the rates were not a thing difficult enough in itself, O foolish Churchmen!

The man who wrote the *on dit* which I have quoted sees the danger into which the Convocational proposals would run a Bill, and sounds the note of warning. He fears that the Cabinet may be tied up in such a knot, if the Church presses the Convocational Committee's suggestion, that the knot would need to be cut, and no Bill at all be the result.

No doubt Sir John has his Bill ready. No doubt it proposes to enable Town Councils to give Voluntary schools aid from the rates. No doubt, also, the Board of Education will recommend the reintroduction of the Teachers' Appeal against Dismissal Bill. The Board of Education proposes, but the Cabinet disposes; and the chief elements in the judgment by a Cabinet upon the form and features of a Bill are parliamentary feasibility and time—when the Cabinet is awake.

It has now leaked out that the Secondary Education Local Authority Bill of last June went up to the Cabinet "A Bill to establish a Local Authority *for all forms of education*." It came away from the Cabinet Council mutilated, dismembered, and spoiled.

The same kind of fate attended the Teachers' Appeal against Dismissal Bill; it was a much better measure when it entered the Cabinet than when it left it.

Sir John Gorst's practice and attitude as a Junior Minister has been invariable, whether at the India Office or the Board of Education. If the Cabinet doesn't adopt his proposals, he brings into the House of Commons such maimed and uglified measures as the Cabinet *has* adopted, and makes such irritating speeches upon them as damn their chances from the first. And so it will be again, I fear, in the session of 1902.

It is believed that the decisions of a Cabinet—of *any* Cabinet—depend a good deal on whether the Cabinet meets just before or just after luncheon. A hungry Cabinet is an angry Cabinet, and a Cabinet digesting is often a Cabinet dyspeptic or comatose. Kinglake tells the history of a Cabinet which was asleep, after luncheon or dinner, whilst the Foreign Secretary read to it a dispatch which meant war in Eastern Europe; the dispatch was read without protest, because the other ministers happened to be dozing at the time. "With such wisdom are we governed," the cynic said to his son. It is sad, and it is humorous, to reflect that the future of the schools, the plans of educationists, the claims of bishops, and the efforts of statesmen among the teachers, in this matter of education for next session, may all depend for their issue on the luncheons which certain ministers on a certain day may or may not have made. And that is about all the forecast that I can safely venture upon, as to Education in Parliament this year.

FERULA.

BRITISH MUSEUM

BY MANY HANDS.

"Quot homines, tot sententiæ."

FOR some years, in France as in England, domestic economy or household management has been in much honour as a subject of instruction for girls, and *l'enseignement ménager* across the Channel has not been too proud to take hints from the organisation of "housewifery" on this side. But when one comes to a book on the subject, what a dry thing an English text-book is! It is pretty evident that only the hard, practical, scientific details appeal to the Anglo-Saxon bookmaker. On picking up a French manual, which is called *Une Maison bien tenue*, the difference in the way of handling the subject is striking. Here is housekeeping treated with an airy touch that makes even a duster seem a charming object, and turns a dinner-table into a scene from fairyland. Wise counsels on aëration and sanitation are given in as graceful a way as if they referred to the latest fashionable gossip, and shiftless habits are reproved by a pointed anecdote, or even at times by an apt quotation! True, such a book is not quite meant for schoolgirls, but rather for the grown-up girl who has a house of her own to look after. Still, the contrast between the matter-of-fact text-book that we all know, and this amusing, fluttering, graceful treatment, is none the less astonishing. The Gallic artistic sense can idealise even the making of beds or the sweeping out of a room!

Domestic Economy Idealised.

❧ ❧ ❧

WHERE will you find, in English, an authoress who, while writing on housewifery, has done the equivalent of what Madame Delorme has done? For this lady, in addition to sage directions on the management of the household gods, has pressed into her service Solomon and Shakespeare, Boileau and Brillat Savarin, Thackeray and the Civil Code. She will point you a housewifely maxim by a quotation from the French classics, or occasionally a Latin tag; or she will reprobate some slovenly habit with an apt anecdote drawn from her own experience. Are you in doubt as to the best number of people to ask to dinner? With an epigram of Madame de Genlis she dispels your hesitation: "Not less than the number of the Graces nor more than the Muses." There's the art of invitation in a nutshell. Are you tortured by doubts as to the propriety of your *menu*? She narrates the awful fate of a French *sous-préfet* who was sent to Coventry by the inhabitants of his *préfecture* for having offered them at a soirée beer to quench their thirst! You are warned in time, and, under the able guidance of Madame Delorme, *vous soignez votre menu*, until there is no longer even the shadow of a possibility of your emulating the *sous-préfet*. Agile as her own language, and witty as her race, nothing finds her unprepared.

Literature in the Kitchen.

❧ ❧ ❧

IT is true that the crabbed and crackling tongue of "perfidious Albion" plays strange tricks on her pen at times, when she wishes to diversify her suggestions with an English remark or quotation. How many of us, when we have been "flitting," have sat down before a neatly-packed crate of our goods and chattels, and, like Madame Delorme, have exclaimed with Macbeth, "There is the full"? Indeed, how many of us have ever associated (in correct or incorrect quotation) Macbeth with a household "moving"? It has remained for a Frenchwoman to do that, misled, perhaps, by the messenger's report to Macbeth that Birnam wood "began to move" towards Dunsinane. However, we can pardon the harnessing of Macbeth to a pantechnicon van, for the delicious description of certain piquant *hors d'œuvres* which are recommended for lunch because "they *amuse* the appetite while awaiting the serious items of the meal." Doesn't that express delightfully the difference between the Frenchman's way of regarding the function of eating, and that of people who, as Madame Delorme says, "feel as if a hole had been dug in them by hunger: they fill it—and there's no more to be said!"

Macbeth on Moving.

❧ ❧ ❧

AD HOC, too, has no terrors for Madame Delorme. The effect of the magic pair of words was curious, coming in the midst of a housewifely discourse. It was as if some breeze had wafted them from these shores to France, where they had begun to pervade the atmosphere, as they have done here for so long. But Madame Delorme's *ad hoc* has nothing to do with local authorities, nor with anything so unsympathetic and so lacking in seductiveness. Know, then, that "when you serve ices, it must be in small glass dishes, with spoons *ad hoc!*" And when you give a "*sauterie intime*" (Anglicé, a little hop), "a sort of half-supper should be served on your dining-table, garnished *largely* for the occasion with comestibles and refreshments *ad hoc!*" Would that all occasions on which *ad hoc* is in question were as grateful as those on which it is employed by Madame Delorme. Arid discussion would then give place to the play of "the little glass dish and the *ad hoc* spoon," and instead of the usual bone of contention, we should be recompensed with a "large garnishing of comestibles and refreshments;" and for us, as for Madame Delorme, *ad hoc* would no longer have any terrors.

"Ad hoc" in France.

❧ ❧ ❧

THE book is always amusing, and we could quote for an indefinite time without exhausting its good points. One or two more citations must suffice. Imagine an apostrophe to a parquetry floor in a text-book of domestic economy! Yet this is how the flooring of the antique French *salon* is apostrophised: "O ancient parquetry floors! Children of centenarian oaks, who will know you a century hence? Your solid beams of beautiful dark-brown tone crossed one another in geometric designs, at once an amusement for the eyes and a rest for the mind! Your correct and scientific lines forced one's thoughts to a sort of rectitude; and, not to fall on your polished surface, one had to know how to walk, how to hold oneself, how also to offer one's arm to a lady, while gracefully bowing, without losing one's balance!" There is something superb in the idea of inculcating the necessity for careful sweeping and beeswaxing, by thus magniloquently addressing the floor on which the operations are to be carried out. Only the bathos of "keeping one's balance" is rather pronounced after the splendour of "you children of centenarian oaks." Still we must not expect too much, seeing that we are already indebted to Madame Delorme for the hint that the apostrophe can be

A Parquet Apostrophe.

utilised as much more than a mere rhetorical figure of speech.

❧ ❧ ❧

WE must not give the idea that *Une Maison bien tenue* is solely an amusing book. It is eminently practical, full of wisdom gained evidently from experience, and which does not hesitate to go into the smallest details. How minute Madame Delorme's directions can be, let the following, which shall be our last quotation, show. When describing the cares that must be bestowed on the bedroom, the making of the beds, the sweeping and the dusting, she becomes confidential: "A little bit of advice *en passant*. It is better, for all these exercises, not to have put on one's corset, which is only a nuisance. But, as soon as the last stroke of the broom is given, *vite! le corset!*" If, as is claimed for comedy, it is best to teach by laughter, then Madame Delorme has hit on the very quintessence of the method, for in her hands the most tiresome of household details becomes amusing. Domestic economy, treated thus, becomes the apotheosis of the duster and the basket of keys.

A Confidential Hint.

❧ ❧ ❧

SPEAKING of French books reminds us of another which we have recently read. Periodically in England we have our vocal and written controversies on the rival merits of Greek and German, Latin and French, and periodically, too, educational France is torn by the same dissensions. Not very long ago it was M. Brunetière who was wielding a polemic pen on "Education and Instruction;" now it is M. Gustave Lanson who is to the fore with a remarkably good series of articles on "The University and Modern Society."

Ancients versus Moderns.

The university, it must be understood, has no reference to any separate institution, as it would have in English, but means the whole organisation of French education as instituted by Napoleon, at the head of which is the University of Paris. The Rector of the University of Paris is in a position somewhat resembling that of our Vice-President of the Council, though the post is filled at present by a gentleman, M. Gréard, of a very different type to our actual Vice-President. The English President of the Council is represented in France by the Minister of Education, M. Georges Leygues. *A propos* of a reform in secondary education just introduced by M. Leygues, the battle of the ancients and the moderns is fought again by M. Gustave Lanson. Much of what he writes is pertinent only to French education, but he emphasises a point which is new and striking.

❧ ❧ ❧

PLEADING for the modern as against the classical education, on grounds of necessity and expediency, he introduces a criticism of modern instruction as given in France. He pleads for the introduction of the scientific *method* into all modern instruction, in literature and in history as well as in science. An illustration will show his meaning, and will also show how very applicable his criticism is to England. While making tremendous efforts to oust a purely classical training from the French schools, and while making great strides in the introduction of modern subjects, he says, they have allowed the old classical *methods* to take possession of the modern *subjects*. Take the case of modern languages. Instead of being taught on scientific lines, as living tongues, they have been treated as though they were dead languages to be dissected grammatically. The result is that of practical result there is very little to show; and whereas even teachers of Greek and Latin have been improving their methods, and trying to teach these dead tongues as though they were living ones, the actual modern living tongues are taught as though they were dead—that is, on purely etymological, grammatical lines. The classical method has strangled the modern movement.

The Scientific Spirit.

❧ ❧ ❧

THE criticism might equally well have been launched against ourselves. "After seven years of exercises, one possessed to a wonderful degree (I speak, of course, of the good pupils) the grammatical mechanism of German or English, and one knew nothing of the words employed by English and Germans to communicate their thoughts. If one knew any words, they were an artistic or philosophic, an archaic or a rare vocabulary; nothing familiar and common. I read Byron in my philosophy class (the highest in a French secondary school), and yet I shouldn't have been able to order my lunch in a London restaurant." The quotation might stand as an indictment of the result of the teaching of French and German in English schools, with rare exceptions. Almost every day some new Jeremiah arises to wail over our commercial decay, attributing it, in some measure, to our ignorance of foreign tongues. What is in fault? M. Lanson has indicated it. We, like his compatriots, work our modern instruction on classical methods, with a similar result. And that result will obtain till two things have been recognized—(*a*) that only those can teach a foreign language who really possess it and are saturated with it; and (*b*) that it is only the new, intuitive, scientific method which will give practical results. Till this is accepted and practised, our Jeremiahs will have only too steady an occupation.

"De te Fabula narratur."

❧ ❧ ❧

ONE of the pleasing experiences falling to the lot of the editor of THE PRACTICAL TEACHER is the receipt of communications from our brethren whose lot is cast across the waste of waters anywhere from China to Peru. As we write we have before us such pleasant reminders from New Zealand and from Victoria. It is with heartfelt feeling that we greet these our brethren, and assure them that we set a high value on their esteem and appreciation.

Hands across the Sea.

❧ ❧ ❧

IN dealing with Mr. Sadler's reports on the various schemes of education in Greater Britain, we had to express our regret that such a progressive state as that of Victoria should gauge its educational progress, and pay its teachers, by so-called results, as though education could be measured with a tape-measure or a foot-rule. We rejoice that this reproach has been wiped out, and that Victoria can now lay just claim to a rational system of education.

Exit Payment by Results from Victoria.

❧ ❧ ❧

THERE are one or two clauses in the Abolition Bill to which we may usefully refer, of which the first is the appointment of a Director of Education, who is to receive a salary of £1,000 per annum, and to be responsible, next to the Minister of Education, for the carrying into practice all Acts in any way relating to education.

The Bill.

❧ ❧ ❧

CLAUSE 4 is as humane as it is educational. It reads as follows: "No person shall, during school hours or on any school day, employ any child in any labour exercised by such person by way of trade, or for the purpose of gain, unless such child is at least fourteen years of age, or is at least thirteen years of age and holds a certificate of having been educated up to the standard, as hereinafter provided." The penalty for breach of this clause is from £1 to £2 for a first offence, and from £2 to £5 for subsequent offences; and it is specially laid down in Subsection 3 that "any person includes parents as well as other employers."

Child Labour.

❧ ❧ ❧

IN such a thinly-populated country as Victoria it is not to be expected that school attendance officers shall seek out children of school age; hence the onus of this is thrown upon the parent, who, after July 1, 1902, must supply the nearest school teacher, or other authorised person, with a list of all his children of not less than six nor more than fourteen years of age, so that the teacher may register such child. Moreover, upon removal from one district to another, the parent is compelled, "within fourteen days after so removing," to register his children as above. And it is the duty of the head-teacher of every State school to keep this register, the penalty of failure for all parties concerned being a fine of not less than 5s., nor more than 20s.

Parents as Attendance Officers.

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IT cannot be said that there is anything Draconic in the regulations as to compulsion, as laid down in Clause 7, which reads as follows: "The parent of any child, not having a reasonable excuse, who neglects to cause such child to attend school for at least 75 per cent. of the whole number of half-days on which such school was open during any quarter of a year, may be summoned by any person authorised by the minister, or the local board of advice, before a court of petty sessions, and, on conviction of such offence, shall forfeit and pay a sum not exceeding 5s. for a first offence, and not less than 5s., nor more than 20s., for each succeeding offence, whether in respect of the same child or any other of his children, or in default may be imprisoned for a term not exceeding seven days."

Compulsion.

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CLAUSE 11 affords a very useful lesson to the mother from the child State. It enacts that, except in the case of removal from one school district to another, it shall not, "during the currency of the half-year ending on the last day of June and on the last day of January in any year, be lawful for any child, without the written consent of the Board of Advice of the district, to be transferred from any State school to any other State school."

Capricious Flitting from School to School.

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AMONGST the worst features of the dismal system of payment by so-called results is the demoralising hold it takes upon its victims. Thus it is that we in England cannot be sure that we have done right in parting with the detestable fraud; and we opine that, for the same reason, the Victorian authorities enact that, for special-subject instruction, a fee shall be payable, to which the teacher shall be entitled, subject to certain deductions; but that if the Inspector reports that the instruction is not satisfactory, the money so paid shall go to the consolidated revenue. This is not business. If a man's work is bad through his own fault, he should be cautioned or reprimanded, and finally dismissed, if he does not make a reasonable effort to come up to the standard of efficiency.

The Ghost of the Sad System.

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FOLLOWING upon the heels of the abolition of the system of payment by results comes the Minister of Education's Bill for the regulation of the teachers' salaries, which, as above indicated, are now to be fixed. Schools are to be grouped into six classes according to their attendance—the first class consisting of schools with seven hundred and ten pupils in average attendance, whilst the sixth class has an average of less than twenty. The maximum salary of a Class I. head-teacher is £432 per annum, whilst his commencing salary is to be £360. So much for the giant school; now for the pigmy. The head-teacher of a Class VI. school commences at £100, and can go no higher than £120 per annum. As for assistants, they range from £100 to £240, according mainly to the size of their schools. For women teachers the salaries are from £88 to £208. They can only rank as head-teachers for small schools. In the large schools they are classed as "infant teachers or assistants," which goes to show that the teacher of the younger children in Victoria is treated even more unjustly than she is with us.

The Teachers' Turn.

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ALTHOUGH Sir John Gorst did not go the length of saying, *Nemo fere sobrius saltat*, he made such an ado about the evening school scholars dancing away the Consolidated Fund, that nobody dare name dancing in connection with school teaching in these days of his rule. Now we are hardened teachers of the graceful art of tripping, and have ere now edified one of Sir John's Inspectors by putting a class through the mysteries of the Lancers or the Quadrilles, which makes us all the more pleased to read in the organ of the Melbourne Head-Teachers' Association the following *on dit:* "Competitions in dancing and calisthenics between classes from State and other schools were watched—[somewhat in the same way, but not in the same spirit, as Sir John watched in the nights that were]—in the main hall in the evening by great numbers of interested people." And the dancing had been taught at the expense of that awful school fund, too!

Something for Sir John.

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IT is not surprising that there should be such a hearty response from the women of our profession to the call of the Government for service in the refugee camps. It is to be most devoutly hoped that the authorities will appreciate the splendid patriotism and courage shown by these mistresses, and go out of their way to make them as comfortable as they possibly may be. We fear that there is much disillusion and more misery in store for the volunteers, and not the least of their ills will be the dirt they will have to fight against and live amongst, to say nothing of the hardships inseparable from camp life. The step should, therefore, not lightly be taken, and only the most robust and the most self-reliant of women teachers should entertain the proposition of a transfer from England to South Africa. School Boards and managers generally should be asked to undertake to replace teachers in their positions, upon

Women Teachers and South Africa.

return at the end of their twelve months' engagement; and it will be well to have this undertaking in writing. Those who finally set out have our hearty wishes for a pleasant sojourn amongst the refugees, who will, we hope, show some gratitude for the great service to be rendered them in committing their children to the charge of the tenderest of women, for that is what we know the women teachers of England to be. We wish them a hearty God-speed.

WITH OUR CHILDREN.

"TO every thing there is a season, and a time to every purpose under the heaven." We are reminded once more of these words of the Preacher by the evidence now before us that the "season" has again opened for the child student. In one aspect it may be said to this individual, "Thou hast all seasons for thine own;" for the child is ever with us, collectively or individually, and cannot wholly escape the notice of the least observant among us. But as regards the systematic course of work undertaken by the various branches of the British Child-Study Association and kindred societies, the bulk of the work is naturally undertaken during the winter months.

A New Campaign.

TO begin with the Metropolitan Branch of the B.C.S.A., the lecture programme promises several interesting evenings, especially for teachers. Dr. F. Warner contributes "A Study of Children as a Guide to Educational Problems," a title which might well be taken as the motto of all who engage in this work. The study of children is almost the only study which has hitherto found no place in the teacher's professional training, while it should certainly form the central principle round which all other necessary studies may be grouped, and from which their relative values are to be determined. Dr. Shuttleworth will try to answer the question, "What can be done for the morally defective child?" The cane and the Decalogue have had a long innings, and it is time that a careful study of the child should be recognised as an element in this great problem. The London programme contains other lectures of scarcely less importance, and in addition gives lists of the centres for reading and practical work, which have proved so stimulating and successful, of parents' circles, and of new circles to be formed.

London Branch B.C.S.A.

THE Birmingham Branch, in addition to providing reading and working circles, offers a valuable course of lectures, on educational and kindred subjects. Mr. Legard, H.M. Inspector, treats of "The Teaching of History;" Mrs. Burgwin discusses "A Healthy School Life;" Mrs. Sherbroke Walker, "The Social Side of Child Training;" and Dr. Walter Jordan, "Heredity." Professor Chamberlain's recent work on "The Child" will form the subject of study in a reading circle. Those who were privileged to witness the vitality and vigour of the Birmingham Branch, as displayed at last annual meeting of the association, will be ready to prophesy for it a successful season's work during the winter.

Work at Birmingham.

THE Edinburgh Branch is likewise to the fore with its programme of work. The ordinary lecture course includes "The Methods of Child-Study," by Dr. W. B. Drummond; "Practical Child-Study in Schools," by Dr. J. Gunn; and "Caution in Child-Study," by Miss M. R. Walker. In addition to this domestic bill of fare, a special course is provided, "Concerning Children," by Dr. Drummond. Those who have read his little book, *The Child: His Nature and Nurture*, which was recently noticed in these columns, will be best able to understand the service which this branch is performing to educators of all classes in arranging for this valuable course. In addition, practical work of a collective nature is being undertaken among the members.

The Edinburgh Programme.

THOSE who visited the recent Exhibitions at Glasgow and Paris have doubtless learned something of the doings of the International Association, which endeavours, by means of lectures and expositions on science, art, and education, to secure some practical educative results from such collections of things and of people. Readers of this journal will learn with pleasure that two lectures on Child-Study secured the record attendances of the course at Glasgow. As a result of these, a large meeting of teachers and others interested in education was held at the United Free Church Training College, and preliminary measures were taken for the formation of a new branch of the B.C.S.A. With the interest shown in the matter by the foremost educationists of the Second City, such a branch may be expected to set an example to others in active, well-directed efforts to solve the real problem of education.

The Glasgow Awakening.

THE winter programme of the Childhood Society (for the Scientific Study of the Mental and Physical Conditions of Children) is likewise to hand. Some notice was recently taken in this column of the prize essay scheme of this society; and it is an appropriate arrangement which places first in the order of public meetings a discussion of the problems set for the essays, and which assigns the leading place in this discussion to two of the prize-winners—Mrs. Florence Owen, Bristol, and Mr. Mark Hughes, B.A., Wellington. Other discussions which promise to be of interest deal with the social or sociological bearings of the investigations carried on by the society, and with the question of school discipline, viewed from the respective standpoints of the scientist, the inspector, the teacher, and the medical man. This last meeting should prove at least interesting to teachers, unless the teacher's point of view is assumed to be the only one possible in the question of discipline. There is one point of view not expressly mentioned in the discussion, and that is the child's own view of the matter. Surely the Childhood Society cannot regard the child as either an uninterested or a merely passive spectator in the matter of school discipline; after all is said that can be said from the standpoints mentioned, the real beneficial result depends in large measure on the point of view taken by the child. School discipline does not, of course, depend for its existence on the good will of the pupil, for it may, and often does, exist in spite of his efforts to the contrary; but regarded as a factor in the child's education, any treatment of the subject which does not take account of the child himself first, and last, and all through, must be merely empirical and dogmatic. J. G.

The Childhood Society.

N.U.T. NOTES.

THE suffering and distressed will, on the authority of Holy Writ, be ever with us; and it is no small comfort to realise that kind hearts, clear heads, and busy hands, in many parts of the country, are doing all that is humanly possible to raise funds for the widows and orphans, and those afflicted "in mind, body, or estate." Prominent among the "special efforts" of the past month are (1) the Sheffield Children's Musical Festival, and (2) the Hull Century Bazaar.

B. and O. Council.

The Sheffield teachers have, as long as I can remember, been amongst the foremost in sacrificing time and comfort, money and ability, on behalf of those unable to help themselves; and they were, in every way, a most suitable body to entrust with the direct oversight of the Girls' Orphanage, which they had so big a share in securing. "Three crowded houses, magnificent singing, perfect displays of drill, energetic officials, and smooth working" characterised the festival, and although the amount realised is not yet known, it is bound to be a large one.

The Hull teachers aimed high when they set themselves to raise £1,000; but the end has been more than achieved. My old friend and college companion, Mr. James Chilman, must have been highly gratified at being able to forward his interesting description of the function to Russell Square.

The Council was, last month, the scene of an important discussion as to whether the practice of granting temporary loans should be entirely discontinued. By a large majority, however, it was decided to adhere to the present custom. My own feeling is that the granting of loans has been, in many instances, most helpful and opportune; and though unsatisfactory borrowers do undoubtedly exist, the large proportion are of unchallenged probity, and faithfully discharge their obligations.

THE nomination of candidates for (*a*) the Vice-Presidency of the Union, and (*b*) the various three-membered electoral districts, has gone on merrily during November and December; and although nominations may be over-estimated, they are, nevertheless, exceedingly useful.

N.U.T. Elections.

For the Vice-Presidency, Mr. Coward, last year's "runner-up," appears to have a rosy chance of success, and, if there be anything in precedent, it will be my privilege to announce his victory on Easter Monday in the city where he is highly esteemed, and has done so much. I do not lose sight of the fact that Messrs. T. H. Jones and George Sharples will be extremely formidable opponents, who will poll heavily in many districts, and whose success would be intensely popular in certain quarters. Whether they win or lose in 1902, each is bound to occupy the presidential chair before the century has gone far. I confess that the magnitude of Mr. Muscott's poll last year surprised me more than a little, and though he will probably increase it, the "rural champion's" turn is certainly not yet. Some day or other Conference may determine that the Executive shall elect the Vice-President. After all, the Executive is the only body to whom an accurate estimate of the various candidates' qualities is possible.

The Executive election seems to be causing little or no interest, and where no questions of policy or persons are involved, this is perhaps not surprising. One reform, however, is urgently needed in this election. At present it has simply degenerated into a yearly scramble, but I am hopeful that the Bristol Conference will pronounce in favour of a *three* years' term of office.

NEVER had I the good fortune to hold personal converse with the late Dr. T. E. Heller, although in my younger days I have received from him an occasional letter, written laboriously with his own hand, and signed "Thomas Edmund Heller" in full. Those of us who attended the Brighton Conference will never forget his last appearance on a Union platform, when he was too ill to deliver an address, but when a letter conveying his good wishes, and evincing his deep interest, was read by the talented young President—the very antithesis of the aged and feeble ex-secretary. Dr. Heller's task at the outset was one of peculiar difficulty and anxiety, necessitating an unusual amount of tact and *savoir faire*. Under his wise care, however, the foundations of the Union were laid broad and deep; and it is fitting that his lifelong work on behalf of education should never be forgotten. It is confidently hoped that sufficient funds will be raised to found either a scholarship or an annuity in connection with the B. and O. Fund, in addition to placing a memorial in Cheltenham Training College, where he was a student during the years 1857–8. The *personnel* of the Union has materially altered since he relinquished the secretarial reins, but enough of the older members remain to furnish tangible evidence of the teachers' gratitude.

Dr. Heller's Memorial.

SINCE the beginning of 1892, Mr. T. A. Organ, B.A., Barrister-at-Law, has been one of the most trusted of Union officials—ever at his post, ready and anxious to place his sound judgment and ripe experience at the disposal of those who had a claim on his services. Mr. Organ is to-day possibly the greatest living authority on "school law;" and, in addition, he has so skilfully, and at the same time delicately, organised the tenure operations of the Union as to enhance its reputation, and to make tyrannical and ill-disposed managers and School Board members pause before committing acts of flagrant injustice. Possessed of almost unequalled *sang-froid*, and devoid of sentiment as he professes himself to be, Mr. Organ would have been more than human not to be touched by the unanimous and eloquent manner in which his praises were sung when the Executive, with the greatest regret, were compelled to accept his resignation. He goes to his new sphere of labour with the good wishes, not only of the Executive, but of the forty-five thousand members whom they represent, many of whom have had abundant reasons to shower blessings on his head. His place will be difficult to fill; but it is some slight satisfaction to know that his new vocation will still permit him to remain one of the Union's standing counsel.

Resignation of Mr. T. A. Organ.

A SINGULARLY instructive return has lately been compiled by Mr. Alfred L. Cann, B.A., the capable and energetic secretary of the National Association of Teachers in Central Classes. The return gives the fullest information from fifty-three pupil-teacher centres on the following points:—(*a*) Name of principal; (*b*) number of pupil teachers, including probationers and candidates; (*c*) staff, in addition to principal; (*d*) number

Our Pupil-Teacher Centres.

of half-days spent at centre; (*e*) science and art subjects taken, in addition to freehand and physiography; (*f*) fees paid by pupil teachers; (*g*) number of weeks' holiday; (*h*) provision of books for pupil teachers, free of cost or otherwise. Thirty-four of the principals (amongst whom I gladly recognise names well known in N.U.T. circles) are graduates of some British university. The numbers in attendance vary from thirty-five at Middleton (Lancashire) to seven hundred and ninety-two at Liverpool; and naturally there is a corresponding diversity in the size of the centres' staffs. At the Sunderland centre one observes with regret that the first and second year pupil teachers receive but one and a half days' instruction weekly, whilst, on the other hand, the Nottingham Board first year pupil teachers attend at the centre *full time*. Science and art subjects are taught either sparingly or not at all in several of the centres. The fees range from *nil* to five pounds per annum; and certain centres revel in twelve weeks' holiday yearly, though the less fortunate receive but six weeks. The Board of Education will find the return of great value, as will *all* the young teachers' well-wishers.

A. C.

NOTES FROM THE NORTH.

OWING to considerable misunderstanding on the part of teachers and school managers as to when pupils may be transferred to the advanced and higher-grade departments, the Scotch Education Department has issued Circular 333 to clear up the matter. Examinations for the Merit Certificate are now to be held only during the three months preceding August 1 or February 1. In this connection it will be well to note that in future the Merit Certificate will not be an exemption certificate, as by the Education (Scotland) Act, 1900, all pupils who have not reached fourteen years of age, whether they do or do not pass this examination, cannot leave school, unless permission be granted by the School Boards, on account of the necessitous circumstances of the parents. This Act comes into operation on January 1, 1902, and will be the means of enabling the children of our schools to continue their school life. The anticipation that Boards will frequently grant exemption is, I trust, not well founded. The Scotch Education Department is to be congratulated on this quietly-effected reform.

Merit Certificate Exams.

CIRCULAR 334 informs us that the date for the beginning of these examinations is April 19, 1902. They are to be conducted by the Scotch Education Department. In accordance with Article 74 of the Continuation Class Code, examinations will, as a rule, be held in the advanced and honours stages only. For the present year, however, the Department will consider applications for examination in the elementary stages of certain subjects on behalf of pupil teachers or assistant teachers (Art. 79 of Day School Code) who are going forward for the King's Scholarship or Certificate Examinations. The latter applications are to be made through school managers. Secondary school pupils are not to be admitted to these examinations, but may be tested as regards science at the Leaving Certificate Examinations. For such pupils the Department is also contemplating examinations in drawing on similar lines. The examination in drawing with chalk on the blackboard is to be discontinued. All students of continuation classes are to make application to the managers for permission to sit at these examinations, whilst teachers, pupil teachers, and other persons who are not students of such classes, are to apply to the School Board of the district. Forms are to be returned not later than February 15.

Local Examinations, 1902.

AT present the question of the introduction of freearm drawing into the curriculum of our schools is still absorbing considerable attention in various quarters. One or two School Boards have approached the Department with a view to their withdrawing the subject from the schools. The Department, however, in a letter recently received by the Galashiels School Board, has intimated that the scheme of instruction was adopted after careful consideration, and on the best expert advice at their Lordships' command, and they are not prepared to eliminate freearm drawing from the Code. It is left to the various Boards to submit alternative proposals, which will be considered on their merits. They do not insist that freearm drawing should be introduced into all the schools forthwith, and they do not think that any Board should prescribe a uniform scheme for its schools, whether that scheme includes or excludes freearm drawing. They are of opinion that some of the defects ascribed to the subject are due to the fact that some teachers have had no experience in the work, and do not properly understand its aims. This should not debar other teachers and Boards from adopting the subject, should they approve of this method of instruction. This latitude will be much welcomed in many districts.

Freearm Drawing.

THE Vice-President of the Institute, Mr. S. M. Murray, Sciennes, has set himself the difficult task of reforming the machinery of that august body. From an address recently delivered by him in Aberdeen we gather that he considers the present General Committee of the Institute too cumbrous and unwieldy. Again, he pointed out that it has too few meetings, and that from December to May there are no meetings, in spite of the fact that during that period Parliament meets, the educational policy of the Government is elaborated, and the Code issued. Since there are no meetings during all that time, no reports are published of its work, and, as a result, he thinks the members take little interest in its doings. He advocates more frequent meetings, and a smaller executive committee. He is of opinion that if members know the policy of the Institute on any particular point, this knowledge will react in quickening the interest at headquarters, because no body can or does work as well as an executive which knows that its actions are open to immediate criticism. Mr. Murray has set himself a herculean task, and it is to be hoped that, in the interest of the Institute, he will press on. Delegation of function in certain circumstances may be all right, but it tends to a lessening of interest on the part of many who would otherwise contribute to the success of the Institute.

The Institute as a Business Concern.

R. G.

COLLECTIVE EXAMINATION OF PUPIL TEACHERS.

SCOTCH EDUCATION DEPARTMENT, DOVER HOUSE, WHITEHALL, S.W., *December 11, 1901.*

SIR,—I am directed to inform you that in future, for the purpose of carrying out the provisions of Art. 70 (*d*) of the Code, an examination will be held yearly for pupil teachers at the end of the second year of their engagement, on the last Saturday of May.

The examination need not be attended by pupil teachers at the end of their first or third year, nor by pupil teachers at the end of their second year, who have obtained the qualifications specified in Art. 70 (*d*) 5.

All pupil teachers, however, including those at the end of their fourth year, will be examined in reading, recitation, teaching, music, and, as a rule, needlework (in the case of girls), on the occasion of H.M. Inspector's visit to the school.

In the case of candidates about to enter for the King's Scholarship Examination, as well as of candidates exempt from that examination under Art. 70 (*d*) 6, the reports on reading, recitation, and teaching will be made on the form relating to such candidates (Form 88 or 146).

Pupil teachers who claim exemption in respect of passes at the Leaving Certificate Examination under Art. 70 (*d*) 5 and 70 (*d*) 6 will be required to show their certificates to H.M. Inspector.

You are requested to intimate each year to H.M. Inspector for the district in which your schools are situated the names of the candidates from your schools who, in accordance with the foregoing arrangements, will attend the examination in May.

It is important that intimation should be made not later than the 30th April.

The intimation, headed by the full official name of the school, should specify:—

1. The number of pupil teachers in the school at the end of their second year who, not being exempt from examination under Art. 70 (*d*) 5, will attend the Collective Examination.

2. The number of candidates for a shortened engagement under Art 70 (*b*) who will be presented at the Collective Examination.

The information is required in order to enable H.M. Inspector to procure a sufficient supply of papers. If it is not furnished by the date mentioned, he cannot be responsible for providing for the examination of your pupil teachers and candidates.

On receiving this statement from you, H.M. Inspector will advise you as to the place, date, and hour of the examination.

The candidates will be supplied with exercise books and blotting paper, but they must come provided with pens.

This letter should be inscribed in the log-book and acted upon each year until further notice.—I have the honour to be, sir, your obedient servant,

H. CRAIK.

ON "GENERAL INFORMATION" FOR THE KING'S SCHOLARSHIP.

THE introduction of a new subject—General Information—into the Syllabus for the King's Scholarship Examination has doubtless caused many surmises as to what it is intended to include, and how the general style of question may best be anticipated.

In the first place, it may be stated that the addition of such a "subject," if it may so be called, is most commendable. The general tendency of pedagogic syllabuses and examinations is a narrowing one; certain subjects, which are, as a rule, exactly delimited, have to be prepared, and all available time and thought is bestowed upon them, to the total exclusion of any other line of thought or reading. Hence the student becomes narrowed in mind, and may generally say with the French philosopher, "*Ce que je sais, je sais assez bien, ce que j'ignore, j'ignore parfaitement.*' Although this mental attitude may be justifiable in some cases, yet, in these days of advancing education and wide-spreading interests, there is much that a well-read man or woman is expected to know, not exhaustively, but with a certain amount of familiarity, and that is not found in the usual text-books.

This absence of mental twilight is very observable in young students. They can talk volubly on points connected with their immediate work, but outside of that they have very few ideas, and are dull companions to those who are not familiar with the details of their profession. The same narrowness is often a characteristic of pupils of grammar and secondary schools, though the last few years have improved matters. They may have spent many hours in making Greek and Latin verses, or puzzling out translations—exercises of some importance as aids to etymology, but of little use in cultivating taste and expression in language, since they rarely proceed far enough to appreciate the beauties of an ode of Horace—and find on leaving school with their education "finished," as the phrase is, that they have to start again on entirely different lines. "One of the benefits of college education," says Emerson, "is to show the boys its little avail."

It is not contended that *any* curriculum would "finish" education during the ordinary years of school life. Education is a development which ceases only at death or very advanced years. But that is no reason why some attempt should not be made to equip students with facts which will be of practical utility to them in after life; and hence I repeat that the introduction into a public examination of such a paper as I am dealing with, is entirely commendable.

It has been my practice for many years to set such a paper to those boys and girls who attend an examination for admission to the Centre. Such simple questions as, "Why is it hotter in summer than in winter?" "What is the meaning of M.A., A.M., M.D., P.S., etc.?" "Mention ten eminent men now living, and say for what they are eminent;" "Who is the local Member of Parliament, and what places does he represent?" are rarely answered correctly, and frequently not attempted at all.

Now what are the subjects which go to make up this "General Information," and how may they be studied?

It is obviously impossible in a short article to completely answer either of these queries, but it may be of some assistance to students to indicate a few topics of which they should not be entirely ignorant.

In the first place, a much wider knowledge of English literature is necessary. The minute preparation of the parsing and analysis of one poem per annum is not enough. The beauties of thought and expression are entirely lost sight of in the search for anachronisms, variations of metre, etc. The Scholarship student should have some considerable acquaintance with the best English classics, both verse and prose. The majority of modern novels—and their name is legion—are not worth looking at, compared with the few that are, or ought to be, familiar in our mouths as household words. Emerson's test may well be applied to ascertain the value of a book. "If, after some years, it is still increasing in reputation, it is worth reading." The historical romances of Scott, the wit and pathos of Dickens, the manliness and patriotism of Kingsley, the charming grace of Elia, the intimate knowledge of human nature depicted by Shakespeare, the grandeur of Milton, the honesty and wisdom of Carlyle, the beautiful periods of Ruskin (to mention but a few), are of infinitely more educational value than the nice analysis of a crooked sentence. The poems in the *Golden Treasury*, for example, ought to be read and re-read till all that is striking in them is indelibly fixed on the memory.

But a word of warning must be given. Reading must be reading, and not mere skimming of pages. "Reading maketh a full man" only if books are read in the right way. A good dictionary must be at hand, and some such work as Brewer's *Dictionary of Phrase and Fable*, and any point which is not clear must be looked out, "put in a notebook, learned and conned by rote."

But literature alone is not enough. The student should know something of the chief characters in mythology, in Greek and Roman history, and of the great historical movements in the world's history. A general knowledge of the solar system, of physical and mathematical geography, of commercial geography (that is, the production and interchange of articles, the ports from which shipped, the lines of vessels by which they are carried), is also necessary. How many students could say exactly where the following articles come from, and what they are—shagreen, copal, copra, guano, cochineal?

Then, again, the government of the country should be understood: how members are elected, and how they can resign; the meaning of such terms as Ministry, Cabinet, Civil List, Opposition, Committee, Budget, Estimates, Royal Assent, the Bar, Indictment and Impeachment; and the *modus operandi* of passing a Bill.

Some knowledge is also desirable of the army and navy, their size, cost, branches, etc.; and a citizen of the first maritime power in the world should know something of the parts of a ship, and be able to distinguish an anchor from a bowsprit, or a porthole from a maintop.

Again, local government should receive some attention:

the constitution and election of governing bodies of borough and urban councils; rates and taxes; the administration of justice by magistrates, county courts, judges on assize, etc.

The meaning of all common abbreviations should be known—for example, P.P.C., S P.Q.R., A U.C., K.C.B., ult.; of common French and Latin phrases; of interesting derivations; of the names of towns and countries.

The daily newspaper contains a host of points worth knowing. What is the Stock Exchange, its "bears" and "bulls," etc.? What is the meaning of such a quotation as, "Consols were bought, or bought back, a little, and finished steady with an upward bend. The cash price was $\frac{3}{16}$ up at $91\frac{7}{16}-\frac{9}{16}$, and the account price rose $\frac{1}{8}$ to $91\frac{3}{4}-\frac{7}{8}$"? What is Reuter's, Lloyd's, a limited liability company, a ring, a trust, etc.?

In these days of rapidly increasing scientific knowledge, a nodding acquaintance at the least is necessary with the simpler facts in chemistry, magnetism and electricity, sound, light, heat, physiology and hygiene, and the numerous inventions and discoveries which characterised the last century.

This list, although it is suggestive rather than exhaustive, may appear somewhat alarming in its proportions, but the earnest student will be surprised to find how such knowledge accumulates if it is steadily pursued for a few years. There is no method by which it can be crammed. Read widely, read wisely; never let an expression pass without finding out its meaning. As stated above, a good dictionary, Brewer's *Dictionary of Phrase and Fable*, a dictionary of biography, and *Whitaker's Almanack* will yield, on consultation, nearly all the information needed. A good encyclopædia is, of course, a great advantage. As memory is rarely perfect, a notebook should be carefully kept in which interesting points may be summarised. This book should contain from one hundred to two hundred pages, and be well bound, and each point entered should be carefully indexed. In a few years this will prove an invaluable companion.

At my Centre I set aside an hour per week in which to answer any questions propounded by the pupils. This plan works well. The following are a few of the questions recently asked:—

1. What is wireless telegraphy?
2. What is a lithograph?
3. Derivation and meaning of All Fools' Day, pea-jacket, honeymoon, banshee.
4. Why is a spinning-jenny so called, and why is it referred to as a mule?
5. Who built the Pyramids, and why?
6. What are Undergraduates, Wranglers, and Fellows?
7. What are the duties of the Poet Laureate?
8. What is the derivation and meaning of the terms Lent and Ember weeks?
9. How was the length of a "knot" obtained, and why was it so called?
10. Why are January, February, and March so called?
11. What is the derivation of Pall Mall, of Piccadilly, and of Cheapside?

Scholarship students are invited to join this class and send up any points which present difficulty. They will be answered, as far as possible, in my Tutorial Course for the examination.

A. T. F.

In THE PRACTICAL TEACHER'S ART MONTHLY for January 1902 the following are some of the leading contributions:—

THE MONTH: COLD JANUARY.
THE SCHOOLS AND METHODS OF CHRISTIAN ART.
SIMPLE APPARATUS FOR DEMONSTRATING THE PRINCIPLES OF PROJECTION.
HINTS ON SKETCHING FROM NATURE.
EDUCATIONAL HANDWORK ASSOCIATION OF SCOTLAND.
SOME BIRD STUDIES FOR SCHOOLS.
NATURE STUDIES FOR ART CLASS TEACHERS' CERTIFICATE.
DAILY ROUNDS OF A DRAWING INSPECTOR.
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MANUAL TRAINING IN THE SCHOOL CURRICULUM.
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JENA AND ITS HOLIDAY COURSES.

BY A. E. STYLER,

Modern Language Instructor at the Technical Institutes of Beckenham, Redhill, and Sutton (Surrey C.C.).

III.

"The mere words of foreign tongues are themselves curiosities to us, often full of new suggestion; phrases proverbial and trite to the native are to the foreign student, who grasps their meaning for the first time, quaint witticisms, new figures of speech. Metaphors and similes which his mother tongue will not tolerate, quips and cranks which cannot be translated, word-pictures that his own authors never paint, life phases that his home literature never touches—all these and more are the booty of the linguist."

A School Syllabus.

IN one of his lectures on General Didactics, Dr. Rein traced out the principles which should guide us in framing a school syllabus. In order that the subject-matter may be so chosen and graduated as to be always "congenial" to the learner, it is of prime importance to study the normal development of the child, and to note what faculties predominate at different stages. First comes the age of vivid imagination, of free untrammelled fancy, when the chief mental characteristics of the child are great love of fairy tales, delight in the impossible or improbable, absence of definite ideas as to time and space, and innocent ignorance of natural laws. But fancy dwindles in the harsh light of reality, and memory next reigns supreme, to be in turn ousted by the reasoning faculties, when the learner has reached the age of thought and reflection.

A striking parallel was drawn between this growth of the individual intellect and the evolution of the mind of the nation. In studying the infancy of a great people, we marvel at the rich imagery of myth and folklore; and the wild fancy of the savage, who gazes heavenward at the dim "pathway of the ghosts and shadows" stretching across the midnight sky, recalls the weird imaginings of our own childhood. Then comes the age of chronicle, epic, and history—the memory of the nations. Lastly, the stage of philosophic thought is reached, when the traditions of the race are rigorously sifted and criticised, and the adult mind of the nation "puts away childish things."

Similarly, the moral nature of the child was discussed—the blind obedience of the little one, the strife of wills in which parent and teacher must see to it that they are the victors, the willing obedience of the older child gradually developing into rational submission to the inner authority of moral principles. Applying this to the growth of civilisation, we have the patriarchal period, the blind submission of the individual to the tribal chief; then the slow evolution of law, and the final establishment in the adult nation of enlightened government and an established standard of morality.

The choice of subjects and the range of subject-matter, therefore, must be so ordered as to follow the normal development of the individual and of the race. This is the principle adopted in the elementary school syllabus framed in the Jena seminary. The weekly hours of work range from sixteen in the first school year to thirty-two in the eighth, at the end of which the pupils attain the age of fourteen. The object of the religious instruction in the first three years is not, as so often happens in our schools, the burdening of little minds with a mass of Biblical or liturgical facts, but rather the cultivation of true religious feeling. The main features are devotional exercises, and the celebration of the Christmas feast in school. Under the head of secular history we find a selection from Grimm's fairy tales, *Robinson Crusoe*, and, in the third year, local legends, which subjects also supply the reading matter for the first three years.

Another important principle is that the instruction starts from the child's immediate surroundings. "Geography begins at home," and so does physical science. *Robinson Crusoe*, which at first sight scarcely seems *heimatlich* for a school in the heart of Germany, is treated as the struggle of an individual thrown on his own resources, and making the

most of what he finds around him. Tracing history through years four to eight, we find first the Nibelungen legends (Gudrun), and then four periods commencing with Hermann, the famous destroyer of the Roman legions, and ending with the re-establishment of the German Empire in 1871. Have the early or the later periods of history the greater educational value? We can apply Dr. Rein's *historisch-genetisch* theory to settle this vexed question. Any one who has taught our Hanoverian period, with its resemblance to complex present-day politics, knows that it is not "congenial" to boys of the fourth or even fifth standard; yet these boys find the Stuart period so interesting that they play at "Cavaliers and Roundheads." The connection of the various subjects is well worked out on this *Lehrplan;* for example, the scholars who take the Nibelungen legends for history and reading also utilise them as interesting *Lebensformen* for drawing.

I have described this syllabus here in order that it may be better understood how certain subjects came to be chosen for the criticism lessons in the course on Special Didactics—familiar home subjects for the younger, and things unfamiliar and remote for the older scholars. To me it was a pleasant novelty to crystallise my pedagogic ideas in German; to be reminded that when the interest of the pupil is keen, he learns *leicht, gern, und mehr* (easily, gladly, and more); or that, in presenting an object to the class for consideration, four various modes may be, *Was? Wie? Warum? Wie schön!* (What is it? What are its properties? Why is it? How beautiful it is!) The two great tasks of the teacher—to enable the child to *know* something and to *do* something—seem to assume new significance when dressed up in German as *wissen und können*, especially when the former is scientifically subdivided into *concrete* observation and the formation of *abstract* ideas therefrom, and the latter is further described as practical application (*Anwendung*).

International Criticism Lessons.

But the criticism lessons, with the eager discussions that followed them, were of even greater interest than Herr Lehmensick's able lectures. On the first occasion, twelve boys of the fourth school year troop in, the international audience settle down to listen, with notebook and pencil ready, and the teacher begins, speaking very little, but solemnly, impressively. The boys relate the legend of Siegfried and Kriemhild boldly and clearly, with no hesitation, and with the intonation of fluent reading or recitation. I fail to grasp the purpose of the lesson. The teacher prompts occasionally, but often several minutes pass during which he does nothing but nod encouragingly, while the scholars pour forth their seemingly endless stream of detailed narration, the "good boy" doing the lion's share. The teacher occasionally sums up a portion of the story by a sentence on the blackboard: "Kriemhild learns what has happened; Siegfried is brought to Worms; Kriemhild finds his corpse; Siegfried's death becomes known; The body is brought to the cathedral." But the long narrative becomes dull and tedious. Why is there no exchange of question and answer? Why not contrast the period of the legend with modern times? Why allow two or three boys to do all the talking?

The lesson over, the boys march out, and a stormy debate takes place, in which hard knocks are given and taken in a manner worthy of the warlike Germans of old. Most of the criticism is adverse, and the general impression appears to be that this "developing" method is quite unsuitable when the matter is well known to the children—the very essence of the method being the gradual building up of a previously unknown story, under the skilful direction and suggestion of the teacher. One speaker opines that the method unduly puzzles the children; another that it is not suitable for historical matter. But the most important result of the debate is the resolution to give a second illustration of this famous method, by means of an absolutely new subject, chosen by a properly constituted committee of leading teachers.

In this case the method was triumphantly shown to be an admirable teaching device when skilfully handled. The seventh school year is selected, because the lesson is to deal with a distant land, Corsica. The boys give long, loud answers; and their wonderful power of continuous fluent speech is perhaps the most remarkable thing I have noted in German school children—the outcome, probably, of long and careful training. One pupil omits something essential, and another completes the answer for him. One stutters a little, and has to repeat. The children gather from the teacher's hints that a fight had taken place, and that the fugitive begs the Corsican boy to hide him from his pursuers. There is keen interest, mental activity, and emulation. It is pleasant to note the quick, earnest glance which one eager boy, with upraised hand, casts at his rival behind him. After a certain portion of the story has been "developed," the teacher sums up: "How a peasant boy receives a fugitive." The teacher now reaches the dramatic episode of the temptation. A few little hints about the pursuer, the tempting watch which he holds glittering in the sun, and the children understand how the Corsican boy is led to betray the fugitive. They readily relate the tale of the betrayal, and the teacher has almost nothing to do, until he sums up again on the blackboard; after which, with the question, "What shall we now find out?" he goes on to another stage of the story, never wasting time by long pauses, but choosing the ready boy. He makes the class feel the dramatic power of the story; when the tragic climax is reached, some of the lads have tears in their eyes. Yet they are as emulous and eager as though it were a game. There is now a complete outline of the tale before the class. They have evolved the argument of a poem which they have never heard, but which they are now prepared to assimilate readily. Herr Lehmensick concludes with an expressive reading of the poem, and receives a well-merited salvo of applause.

Another successful lesson was that given by Herr Landmann, on the goat, to children of the second year. It seemed strange to hear the teacher commence with an allusion to Robinson Crusoe and his particular goat; but in doing so he was connecting the lesson with the children's daily reading matter, in the manner alluded to above. The boys are also reminded of the goats seen in Jena, so that the lesson is connected with their daily life and familiar surroundings. "Warum kann die Ziege gut klettern?" (Why can the goat climb well?) One little fellow suggests that it is because the goat has four legs and we only have two. Another discusses the relative merits of *Horn = und Lederschuhe.* Then the problem is solved by handing round a goat's foot, so that the bottom of the hoof may be actually seen. One boy makes marks in modelling clay with the hoof. The children are really interested, and pay close attention. The teacher carefully corrects faults of language. One child describes the sharp edge of the hoof as *scharfe Haut*, which is rejected for more exact terms—*scharfes Horn, Hornkanten.* The material of the hoof is next discussed. Why is horn the best? Why would not glass or iron do as well? Frequent allusions to Robinson Crusoe, and then the question is settled. The teeth of the goat are next shown, and so the second question is solved: "Warum die Ziege gut kauen kann." (Why the goat can chew well.) Lastly the horns are shown, with plenty of natural lively talk on the part of the children; and the lesson concludes with the modelling in clay of various parts of the goat, most of the children choosing the horns. The lesson was a good example of what our German colleagues call *Vorzeigender Unterricht.*

In the subsequent debate, some critics seemed to overlook the important principle of connecting the lesson with the boys' reading, and therefore objected to the allusions to Robinson Crusoe, preferring to link the subject with the home life of the boys and the oft-observed characteristics of the well-known goat of Frau Somebody in Jena. Then Herr Landmann rose to criticise himself. He was very modest, but gave an excellent lesson nevertheless. A pleasing peculiarity in these German *Probelektionen* was that the children were so active, eager, and keenly interested, so ready to take up the knowledge presented, that the teacher had apparently little to do. In the excellent geography lesson on the West India Islands, for older boys, it was the same. The numerous specimens handled and examined by the boys, together with their quick intelligence and ready speech, left very little talking for the teacher. Visitors to Jena next year should certainly take part in these courses, which I found practical, useful, and stimulating. The fight

for the truth—*der Kampf um die Wahrheit*—is often very amusing, but to enjoy it to the full an almost perfect mastery of the German language is necessary.

History and Philosophy.

Of the twelve lectures by Dr. Scheler on philosophy, I heard only one, which I found terribly difficult to follow, in spite of the fact that I was deeply interested in the subject. Indeed, it is impossible to avoid the conclusion that some professors quite failed to realise that they were addressing foreigners, and did not cultivate that clear and deliberate oratory which the occasion demanded. Yet the *Nichtdeutschen* were present in sufficient numbers to deserve some consideration. Of Dr. Steinhausen's course on the history of German civilisation I heard two lectures, which I enjoyed very much. Yet even here, while understanding every word said, I found it a great strain, owing to the rapid rush of successive ideas, and the overwhelming mass of thought crammed into one hour. The following outline will give some notion of the amount of detail through which a poor Englishman was breathlessly hurried in one lecture:—The *weibliche Epoche* of Gellert and Klopstock; the emancipation of the *Bürgertum;* the "enlightenment" of the eighteenth century; the illuminati; the relative position of nobility and middle class in 1800; the educated middle class as a civilising agent; the new impulses received from France; the attitude of Germany with regard to the encyclopedists and their adversaries; the American War of Independence and the French Revolution; the new political ideas of the nineteenth century; the stormy year 1848; the new interest of the average German in politics; the decline of metaphysical and philosophic speculation; the prevalence of realism and pessimism; the characteristics of the present age, with its exaggerated love of money, showy success, and material well-being. These lectures must have been an intellectual treat to German listeners; and if the programme were lightened somewhat, so that the lecturer need not hurry, they would be equally good for the advanced foreign student.

Literature.

The literary subjects were "the chief features of German literature (*Dichtung*) in the second half of the nineteenth century," and "the development of the Faust idea." In these courses the subtle mind of Dr. Bruinier had free play; and some of his views were so amusing, or new and striking, that I made every effort to follow the lectures with fair continuity, in spite of occasional weariness caused by my striving to hear something of everything. Starting with the epoch-making year 1850, he described the old Germany, and the new Germany that was to be; the far-reaching effects of the invention of railways; the great bend in the stream of literary tendency. He defined in clever phrases the genius —*der schaffende Geist*— who is inspired and sees visions, who finds the new, and gives the literary world a fresh impulse. He sketched for us in contrast the virtuoso, the mere imitator whose powers only suffice to dish up the old with concocted brilliancy (*Konstruirtes*). His lectures were full of the interesting antitheses of the century—the man of pure intellect and the practical man of science or commerce; the Prussian and the anti-Prussian; the old time and the new; bygone picturesqueness and the *fürchterliche neue Zeit*. The mere words of a foreign tongue are interesting to us; and in listening to Dr. Bruinier's racy talk, I experienced that peculiar pleasure which comes to us only from a piquant expression or comical word uttered in a language not our own. "*Die imponierende deutsche Rasse: Touristentum und Deutschtümelei: das deutsche Philistertum und die preussische Strammheit: die feine Nase des Feuilletonisten*"—these are a few of the quaint phrases with which the professor so tickled my ear that I was often tempted to laugh outright.

I cannot pause to detail the somewhat severe judgment pronounced on the work of Freytag and Scheffel, Geibel and Heyse. The professor defines a genius as one who possesses more than the ordinary five senses, and who opens up to us the unknown (*das Verborgene*). It is natural, therefore, that he should somewhat despise mere talent. We read the work of a talented author and find it charming, but at a second reading it palls upon us. A work of genius often repels at first, and we cannot read on. We take it up and toy with it, reading passages here and there, and discovering unsuspected charms; but we end by studying and re-studying it, each time lighting upon some new beauty. Dr. Bruinier will not class even Schiller and Lessing as geniuses, although he acknowledges their high literary rank. To him a genius is an inspired seer, whose glowing eye pierces the future, whose voice is a sublime Something without past or present, immortal, independent of time, and whose fate is usually some kind of martyrdom at the hand of his fellows. The genius hears a voice and writes; the figures in his clear vision have colour, form, and speech. It was thus that Goethe wrote his *Götz von Berlichingen;* and it is the possession in some degree of this marvellous power that entitles Friedrich Hebbel, Ibsen, and Otto Ludwig to the name of genius.

The effect of this course of lectures upon me is to make me realise more than ever what a vast world of new and varied reading is opened up when one has learned a foreign language. We in England usually neglect modern German writers; and, apart from our professional reading, we study almost exclusively the great classics. Now, under the spur of Dr. Bruinier's eloquence, we shall set to work upon Felix Dahn's *Kampf um Rom*, or Theodor Storm's *Renata*, or Rosegger's *Waldschulmeister*, or the works of Hebbel and Ludwig. That is one great use of holiday courses. The earnest teacher may or may not acquire as many new ideas in a month as a lazy young freshman does in a half-year; but the chief gain is that the former comes home with the consciousness that he has climbed higher than ever before, has obtained a wider view of new intellectual fields to conquer, and has brought back new zest and new courage to win them.

Faust.

A brief allusion must suffice for Dr. Bruinier's six lectures on the development of the Faust idea. But no one needs to be told that this was a fascinating subject. The weird, lonely student, burning the midnight oil, and dabbling in forbidden knowledge with that interesting personality, the mediæval Satan, ever at his elbow, is a character of whom we modern students, commonplace though we be, can never tire. To enable us better to comprehend Goethe's great work, the lecturer led us through the long series of changing forms which the Faust idea successively assumed. He described Faust as a real personage, the wandering student of the Middle Ages, who poses as a man of great learning, duping the ignorant by all kinds of *Schwindeleien*, and always slinking off when the presence of a genuine scholar causes him to fear exposure. It was next shown how the host of silly stories that gathered round the name finally took the form of a popular play, "Volksschauspiel von Dr. Faust." The influence of Germany upon England in the sixteenth century, the main characteristics of Marlowe's tragedy, and the "Faust" of Lessing brought us down to the time of Goethe. The history given of the composition of Goethe's masterpiece, and the difficulties he experienced in resuming his half-forgotten plan after long interruptions, threw great light upon the varying style of the tragedy. The piquant phraseology peculiar to Dr. Bruinier well suited his half-serious, half-humorous disquisitions on the character of Mephistopheles and the Satanic myths of the Middle Ages. At times he was almost as funny as the *Ingoldsby Legends*.

A most useful feature of the organisation here is the printed outline of the courses, which each student can obtain gratis in the secretary's office. The pamphlet contains lists of selected works, by means of which the visitor can read up on his return home any subject which may have interested him specially. He can bring back to England a little German library, and, while reading by his fireside, he will think of the eloquent voices of the kindly professors whom he heard in Jena. It is a pity that Dr. Bruinier has not followed this plan, for expert guidance in the mass of *Faustliteratur* would be valuable.

Language Courses.

But it is now time to describe more fully what is, after all, the chief essential for the average English visitor—namely,

the language courses. I have already alluded to the conversational exercises as the most practical part of Dr. Bruinier's German course for advanced students. Various pictures were employed—one day the well-known Hölzel picture representing Summer; on another occasion a scene in the Bavarian Alps; on a third the fairy tale of the Wolf and the Seven Kids, in which the devices of the resourceful mother afforded ample material for varied sentence-making. Sometimes it happened that the picture was so small and indistinct that only those who sat quite near could make out the object about which the lecturer was speaking. Sometimes so many and various modes of expression were suggested, that the correct one, the one that merited a place in our notebooks and a pigeon-hole in our memory, was quite lost in the confused mass. But in the main I found these *Sprachübungen* most valuable and helpful—the right kind of thing for the student who would acquire the knack of skilful and accurate expression.

The elementary course conducted by Herr Lehmensick and Herr Landmann was a model of what a language course for foreigners should be, and in all my travels I have seen nothing better. The series of lessons and their accompanying excursions are arranged upon an admirable plan, which must be the outcome of years of experience; and this plan is carried out scrupulously, logically, and systematically. There is here no *Planlosigkeit*, no doubt, no hesitation, no dull pauses. Everything is effective and to the purpose. I glance over the syllabus, and can at once recall the well-ordered lessons, and the pleasant rambles which were really the lessons all over again in a more agreeable form. One lesson deals with the sights of the town, and to correspond with it a walk is taken round the Graben—that is, the streets which mark the site of the ancient moat. The subject of another lesson is the environs of Jena, whereupon we go for a stroll to the Bismarckhöhe, whence the town and its charming surroundings can be seen. To the language teacher this elementary course was peculiarly useful, as illustrating the daily difficulties and pleasures of his own special work. There is, above all, the phenomenal slowness of the beginner to *understand* the spoken language—a miraculous dullness of ear and understanding which furnishes perhaps the best argument in favour of the new method. What is the use of mere grammatical studies and written examination successes as long as this difficulty remains unconquered or even unattacked? In Jena I tried upon a beginner an interesting experiment which lasted the whole three weeks. It was my habit to address him invariably with the question, *Wie geht's?* (How are you getting on?), which he always understood as, "Where are you going?" So that his reply was, *Nach Hause*, or *Nach dem Markt*. This had a most ludicrous effect, and seems to show that our first aim should be to enable the pupil to *understand* the language in its simplest form, that this process must in many cases be a slow and painful one, and that, therefore, it is foolish for a beginner to attend a short holiday course.

What I saw in the elementary German course also confirmed my opinion that the new method makes vast demands upon the teacher's powers—that it is, in fact, a magnificent ideal which the teacher cannot expect to realise to the full; for every teacher cannot hope to combine in his own person the gifts of a perfect linguist, a perfect pedagogue, and a perfect draughtsman. Considerable practical command of the language and thorough knowledge of method are essential; skilful blackboard drawings are a great aid, but crude ones have a ludicrous effect, and disorganise the class by producing too much laughter. Both Herr Lehmensick and Herr Landmann paid close attention to pronunciation, though without any elaborate system of phonetics such as that connected with the names of Passy, Rousselot, and Vietor. Both teachers were remarkable for unfailing good-humour and ready kindness, and spared no pains to aid beginners in their difficulties. There was ample opportunity of acquiring practical skill, for the students were constantly encouraged to vary the phrase in every possible way—for example, "It has the shape of a pointed cap; it is shaped like a pointed cap; it looks like a pointed cap." When the pupil is thus taught to manipulate the language, it is a good antidote to excessive translation. A very useful form of written work was the writing of answers to the teacher's oral questions, so that the result was an essay consisting of easy sentences. On other occasions the beginners wrote simple descriptions of what they had seen during their walks—for example, "What we see in the market-place." During the excursions we used to cast dignity aside and troop about under the leadership of the professor, performing all kinds of illustrative actions, regardless of the amused looks of German spectators. It did my eyes good to see a young Englishman, who at home, no doubt, is as stiff and reserved and caste-cribbed as the rest of us, seat himself obediently on the odd stone seats of a doorway, in order to show how the worthy citizens of Jena chatted at their doors in the old time.

Walks and Talks.

But it is impossible to do more than allude to the crowd of new impressions gathered during our numerous walks. One evening we scramble up the ravine to the battle-field, following the route by which Napoleon brought up his cannon. On the breezy plateau the professor gives us a sketch of the great fight in which Prussia was laid low, while the sunset clouds glow blood-red in the west. On another evening we wander to the queer little church in Wenigenjena, and think of the love story of Schiller and Lotte; or sit at the famous stone table in the Schillergarten, and listen to the murmur of the Leutra. Or we pass the well-known inn where Goethe wrote his *Erlkönig*, and then on along the road to Kunitz. Herr Landmann, utilising, as usual, the surroundings as fully as possible, points out the statue of the King of the Mists, and gives us the traditional account of the origin of Goethe's ballad—tradition which modern criticism has, of course, done its best to demolish, and to which we therefore cling all the more obstinately. He then reads the poem in the quiet country road, where everything around aids the imagination and lends an added beauty to the weird story. The next day, one lady, who had been to Kunitz with Dr. Bruinier's party, maintained that they saw two Mist Kings, leaving her awe-struck listeners to infer that, as only one could be the statue, the other must have been the real elfin monarch. But a sceptic suggested that this double vision was perhaps nothing more than the effect of German beer and the *Eierkuchen* for which Kunitz is renowned.

At the close of the language courses I had the pleasant task of thanking Herr Landmann for his kind and efficient teaching; but as it was an impromptu expression of gratitude, I cannot follow the somewhat singular custom of certain colleagues who print the text of their French and German speeches.

The whole holiday at Jena was so crowded with pleasant incident that it is hard to bring these articles to an end. I see before me the long lines of earnest German faces in the evening gatherings at the Burgkeller. I recall somewhat wearily the long, long speeches, so patiently followed by Teutonic listeners with the aid of beer, tobacco, or sausages. I remember wistfully the climb up the terraces of Dornburg, the Saalthal obscured in cloud and mist, or flecked with cloud and sunshine; the streams of students winding along zigzag woodland paths; laughing scrambles, Indian file, through forest boughs; snatches of song and glimpses of the singers far down the steep slope; rustling brown leaves of yester year to tell us that autumn is near, and that the poetry of summer holiday freedom must give place to weary winter and workaday prose. I picture the final meeting in the Burgkeller, where kind-hearted Frau Dr. Schnetger and Dr. Bruinier, humorous as ever, do their best to keep us in merry, jovial mood to the last. I listen to songs of all the nations—a Servian love song, the strange, unknown words of which are a melody themselves, alternating strangely with the familiar "Auld Lang Syne" and "Annie Laurie." And so, after the painful ordeal of good-byes, I quit Jena, *das liebe alte Nest*, and start upon my twenty-four hours' run back to old England, filled with new zest and hope, and realising more than ever how our common love of learning and our common task of improving humanity bind teachers of every rank and nation into one vast brotherhood of peace.

THE SCHOOL OF GEOGRAPHY AT OXFORD.

BY JOAN BERENICE REYNOLDS, B.A.,
Gilchrist Travelling Student, 1897; Diploma in Geography, Oxford.

IT is obvious that any branch of knowledge which is excluded from recognition by our universities lies thereby at a great disadvantage. Apart from the stamp of inferiority thus at once impressed upon it in public estimation, the lack of the stimulus of the more important examinations and their offered prizes will debar more than a very few from entering on the prolonged study necessary for deepening and then extending a real knowledge of the subject, with the necessary result that it will too often be poorly taught, if taught at all, in our schools. For, while all teachers need not be specialists, even the most elementary work will suffer if there be not in the background a body of specialists on the given subject strong enough to influence and assist the teaching of it.

This is what has taken place in the case of geography. While certain geographical facts were taught in the schools on utilitarian grounds, there were so few qualified by special preparation to teach the subject scientifically, and so little idea existed of its educational possibilities, that it was left for any one to teach, and too often to teach anyhow.

The children, bored by definitions and lists of names, grew up with a hearty distaste to the subject; while many educationists decided that a branch of study that exercised the memory only must be a poor affair, and quite unworthy of a place on the school curriculum.

In Germany, during the first half of the nineteenth century, a new light was thrown on the matter by the writings of Humboldt and Ritter, which first placed geography upon a scientific basis. The causal connection between various physical forces and phenomena, and still more between these and the history of humanity, was brought out; and the subject, which had formerly appealed chiefly to the memory, was shown to demand the constant exercise of the reasoning faculty to solve the many complicated problems to which it gave birth. Geographical chairs were established at various Continental universities, especially in Germany, and by this means much has been done to develop different branches of the subject—as Meteorology, Oceanography, Geomorphology, Biogeography, Cartography, etc. At most of these universities geography can be taken by students as their chief subject in the highest examinations for the Ph.D. and other degrees—a fact which accounts for the number of geographical societies abroad, and the general interest manifested in the subject. In Germany it is taught in all the primary and secondary schools both for girls and boys, and special time is devoted to it in technical and commercial colleges. German maps have become famous all the world over, because the publishers can rely on a demand wide enough to allow of their sale at a marvellously low price; while the large number of geographers in the country who are expert critics of cartography exacts a high standard of excellence, especially in school atlases and wall maps.

In our own country, however, little was done to improve the teaching of geography, and raise the subject from the low position it occupied in public estimation, until about the year 1869, since which date the Royal Geographical Society has made several attempts to introduce a better state of affairs. The society for some years gave medals to boys in the great public schools on the results of certain geographical examinations, and in 1884 it appointed Dr. Keltie to inspect and report on methods of teaching geography abroad. The maps and books he collected in connection with this work were placed in the Teachers' Guild Museum in Gower Street. Dr. Keltie in his report stated that there were professors of geography at twelve universities in Germany and eight in Austria-Hungary, and he regretted that none were appointed at British universities, as he was convinced their presence would be a powerful influence in exalting the position of the subject in the schools. He suggested, as a temporary measure, that geographers should be appointed as lecturers at the universities, to enlighten students as to the extent of the field of geography and its value as a university subject. Lectureships were later founded by the Royal Geographical Society at Oxford and Cambridge.

Mr. Mackinder, the lecturer thus appointed at Oxford, in his presidential address to the geographical section of the British Association in 1895, gave it as his opinion that, though his geographical lectures were attended by a large number of historical students, it was hardly likely they would spare the time necessary for a more thorough study of the subject without the stimulus of examinations. In the same address he advocated the establishment of a school of geography at some centre where the subject could be systematically studied, and suggested that, "if a diploma were granted, a certain number of university men might be tempted to interpose a geographical year between the university and the master's desk; for head-masters would probably be only too glad to give the teaching of geography into the hands of specialists, provided these were men of university culture, able to be of general service in school work, and provided also there was adequate guarantee that they were experts."

The final outcome of the discussion to which this address gave rise is the School of Geography now existing at Oxford, which was founded in 1899 by the University of Oxford in co operation with the Royal Geographical Society, and is under a committee of ten gentlemen, including the Vice-Chancellor (*ex officio*) and Sir Clements R. Markham, K.C.B., F.R.S., President of the Royal Geographical Society.

The staff of the school consists of H. J. Mackinder, M.A., student of Christ Church; A. J. Herbertson, Ph.D.; H. N. Dickson, B.Sc., New College; and G. B. Grundy, M.A., Brasenose College. Both men and women, who give satisfactory evidence of having received a good general education, are admitted to the course of study at the school, which extends over an academic year, and prepares them for a geographical examination held in June. A scholarship of the value of £60 is annually awarded on the result of an examination in geography, which is open to members of the University of Oxford who have taken honours in one of the final schools, provided that the scholar agrees to study for a year at the School of Geography, with a view to obtaining the diploma.

Though the school was opened in October 1899, teaching only began in January 1900, and the first examination was held in June 1901. This examination is partly written and theoretical, and partly oral and practical. According to the regulations, candidates are obliged to take the papers of Group I. on General Physical Geography and Regional Geography (Physical, Political, and Economic), but are allowed to select any three of the following papers in Group II.:—

Paper 3.—Geodesy, Climatology, Oceanography.
Paper 4.—Geomorphology.
Paper 5.—Ancient Historical Geography (Political and Economic).
Paper 6.—Mediæval and Modern Geography (Political and Economic).
Paper 7.—The History of Geography.
Paper 8.—Military Geography.
Paper 9.—The Principles of Surveying and Cartography.

A diploma is awarded if the work presented in all subjects selected is sufficient for a pass, and distinction can be obtained for exceptional merit in the answers to any one paper in Group II.

By these regulations it will be seen that opportunity is given to students to specialise in those branches of geography to which they may be inclined by previous study, along historical, classical, or scientific lines, or by the special work they have in view, be it teaching, exploring, map-making, or military.

The School of Geography at present occupies the upper floor of the old Ashmolean building in Broad Street. In one room lectures are given, which are attended not only by those students who are working for the diploma in geography, but also often by many others who find these lectures useful in connection with their various studies. Last session courses of lectures were given on the following subjects:—

By Mr. Mackinder, on "The Development of Geographical Ideas," "The Historical Geography of the British Isles," "The Historical Geography of the Romance and Teutonic Countries of Continental Europe," and "Commercial Geography."

By Mr. Herbertson, on "The Geographical Cycle," and "The Geomorphology of Europe and the other Continents."

By Mr. Dickson, on "The Atmospheric Circulation," "The Climatic Regions of the Globe," and "The Oceans."

By Mr. Grundy, on "The Geographical Development of the Roman Empire."

Another room is fitted up as a laboratory, and there classes are held which are attended only by those specialising in geography—last session by three men students and myself. Besides attending the classes, we were free to study in this room during certain hours, and to make use of the books, maps, and other apparatus kept in it. The atlases in most request for the study of physical geography were the Berghaus Physical Atlas and Bartholomew's Atlas of Meteorology; for the history of geography, the Periplus and Facsimile Atlases, edited by the late Baron Nordenskiöld, and the Kretschmer Atlas, all illustrating the early history of cartography and geographical exploration; and for historical geography, the Oxford Historical Atlas of Modern Europe. Many atlases have been purchased by the school unbound, and the maps rearranged according to regions, as it is found very helpful, in examining a special district, to be able to quickly find and compare several different maps of the same area. The best hand-atlases published in different European countries have also been purchased, as in each are found detailed and reliable maps of the country itself, and of any colonies it possesses. By this means a large number of maps of districts which are rarely represented clearly in even the largest British atlases have been procured at comparatively small cost, while the foreign names do not present any serious difficulty to an intelligent student. Some of the five-shilling German atlases are beautiful specimens of cartography, and give a wonderfully clear idea of relief, especially that of Central Europe—as, for instance, the Sydow-Wagner Methodischer Schul-Atlas, and the Atlas by Drs. Lehmann and Petzold. The Ordnance Survey sheets of important areas have also been obtained from different European countries and the United States, so that a fair foundation has been laid for a collection of recent topographical maps. The wall maps in use are the orographical series by Keipert and Sydow-Habenicht.

The classes held by Mr. Herbertson were largely devoted to map-work, as in the examination on regional geography "candidates may be required to orient, read and draw maps, and to make approximate determinations of distance and area." A knowledge of the physical features of the surface of the earth is also the necessary foundation for a special study of most branches of geography, and this knowledge is best obtained by constant map-work. Classes were also held by Mr. Dickson on "The Figure of the Earth and Terrestial Magnetism," and by Mr. Herbertson on "The Principles of Surveying and Cartography." Mr. Herbertson has devised an apparatus for graphically showing perspective projection, which all who have to teach this branch of cartography would be glad to procure, I feel sure, if it could be manufactured and sold at a reasonable price.

Instruction was also given in the practical work demanded in connection with climatology, oceanography, and surveying, to those students who selected these subjects for examination. It is stated that "candidates who take the paper on surveying may be required to show practical acquaintance with the planimeter, the prismatic compass, the clinometer, the boiling-point thermometer, the theodolite, and the plane-table, and to plot from a field-book;" and some excursions were organised for work of this kind.

No classes were held at the school in the afternoon, but we received private coaching in special subjects, and sometimes attended the lectures on physical geography and geology which were given by Professor Sollas at the Natural History Museum.

For private work we were able to borrow books from the school library, which, though yet in its infancy, contains almost complete sets of the publications of the Royal Geographical Society and the Scottish Geographical Society, besides *The Universal Geography* by Reclus, Stanford's *Compendium of Geography*, some volumes of the *Challenger* Reports, etc., etc.

From the above account it will be seen that there are three methods by which a student can learn at the School of Geography—by lectures, by practical work, and by supervised and criticised private work. In this way it is possible to obtain not only a valuable amount of geographical knowledge and some insight into the geographical aspect of various important questions, but also, what is especially useful to the future teacher, some knowledge of where to find and how best to use such raw materials of geography as exist in books, maps, and, in fact, all around us, from the sky overhead to the soil underfoot.

The school is of such very recent origin that it is impossible as yet to foretell precisely its future course, along what lines it may develop, and to what it may lead. A year seems a short time for a systematic study of geography, or even of a few branches of the subject; yet there are few who can afford to give longer to a subject which does not form part of a degree course. It is naturally hoped that ultimately geography will stand on the same footing as history at the universities, in which case students may be able to devote three or more years to it. The foundation of the School of Geography is certainly a measure which will hasten the realisation of this aim; and though progress seems somewhat slow in Britain, when we consider what has been done for geography abroad, we trust it is none the less sure.

NOTES AND JOTTINGS.

"General Reading:" King's Scholarship, 1902.

Under the above heading two books have been selected by the Board of Education—namely, Scott's *Quentin Durward* and R. L. Stevenson's *Master of Ballantrae*. Students will do well to provide themselves with a copy of the former as published in Nelson's New Century India Paper Edition (2s. net), as this will be the edition adopted by us in connection with a series of special notes and annotations to appear in our columns month by month, by A. T. Flux, first on the Scholarship List. For the latter we would specially direct the attention of our readers to Messrs. Cassell's edition of *The Master of Ballantrae*, with notes and glossary by another well-known Practical Teacher contributor, Mr. Thomas Cartwright, B.A. and B.Sc.

London University Guide.

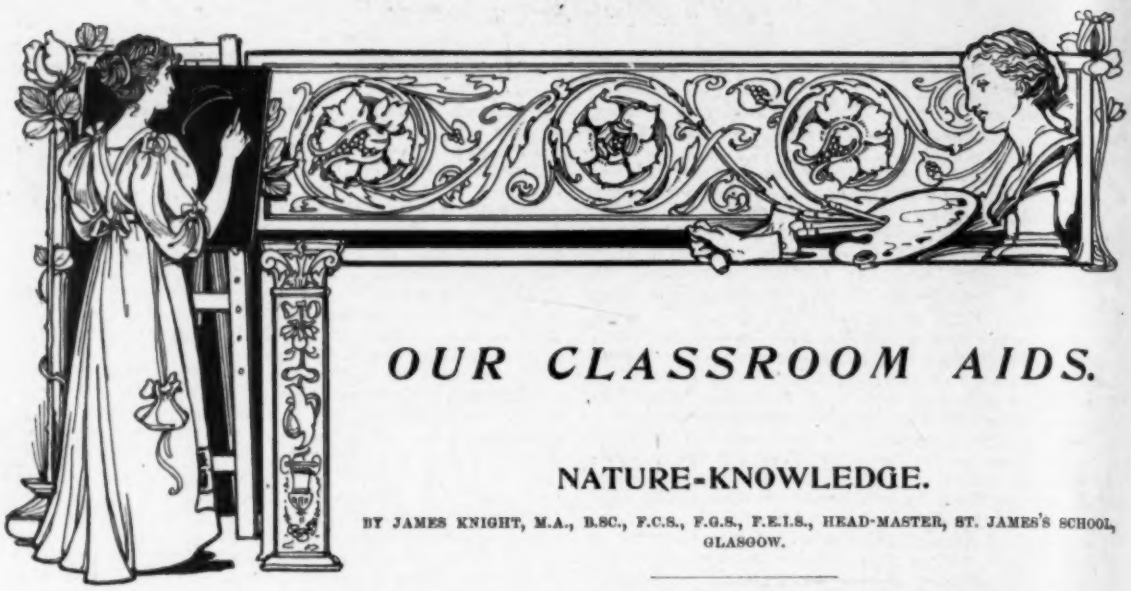
The University Tutorial Press: *The Guide, Almanac, and Calendar for 1901–1902*. The volume is of great value to all students preparing for London University examinations. It contains the fullest particulars relating to examinations, and much valuable advice as to choice of text-books. As a work of reference we have found the annual of much service for several years past, and we have pleasure in recommending the new issue to the notice of our readers. It is published by Messrs. W. B. Clive and Co. of the University Tutorial Press, London and Cambridge.

The Citizen's Atlas.

Messrs. Newnes have done good service in issuing this new *Twentieth Century Citizen's Atlas* in fortnightly parts, for the convenience of the many who prefer to avail themselves of a work in this way. Each part consists of six separate plates, together with a text section of the general index. The whole will be complete in twenty-six fortnightly parts at sixpence each. We have carefully looked over the maps, commercial charts, etc., of the first few numbers, and are convinced that the atlas will prove a thoroughly serviceable one to students and teachers.

Twentieth Century Dictionary.

Messrs. W. and R. Chambers have issued opportunely this valuable *Dictionary of the English Language*. It is pronouncing, explanatory, etymological, and contains technical terms in use in the arts and sciences, colloquialisms, and some useful appendices. The volume is beautifully printed in the clearest of type, illustrated, and bound in cloth. The size of the page is 8" by 5½", and in all there are upwards of 1,200 pages. Issued at the exceedingly low price of 3s. 6d., so fine a specimen of dictionary-making is bound to have a wide sale.



OUR CLASSROOM AIDS.

NATURE-KNOWLEDGE.

BY JAMES KNIGHT, M.A., B.SC., F.C.S., F.G.S., F.E.I.S., HEAD-MASTER, ST. JAMES'S SCHOOL, GLASGOW.

EXPERIMENTS IN PLANT NUTRITION.

MOST people think that plants derive their food from the soil, but this is very far from being the case. To begin with, a great deal of the plant is simply water. Weigh a whole plant; dry it carefully, and weigh again: the difference represents loss mainly of water. Dried wood is only 50 per cent. of the weight of green or growing wood, herbaceous stems show only 20 to 30 per cent., fruits from 15 down to 5 per cent. in the case of the more juicy sorts, while seaweeds and water-plants may have only 2½ per cent. of solid matter left after drying. Take a dry piece of wood and burn it all away; show, by holding a cold glass over the flame, that water is formed, revealing the presence of hydrogen in the dry wood; show, further, by testing some of the hot vapours with lime-water in a tumbler, that carbon dioxide is present, revealing the presence of carbon in wood, a fact also shown by the charring which occurs. When the burning is all over, collect and weigh the ash, and it will be found that this amounts usually to only 1 or 2 per cent. of the whole plant. This small amount represents almost all the solid food obtained from the earth; the other parts of the food have come in a liquid and gaseous state from the air, the rain, and the ground-water fed by the rain.

Plants get carbon dioxide from the air only, though the soil is rich in carbon; conversely, they get nitrogen from the soil only, though there is plenty of it in the air. Nitrogen is taken up by the root-hairs, not as nitrogen gas, but as nitrogenous compounds—nitrates and ammonia salts. The other solid parts of plant food, such as soda, potash, lime, magnesia, iron, etc., all come from the earth; hence the soil gets exhausted. A farmer provides against exhaustion in one of three ways: (1) by giving the land a rest—letting it lie fallow; (2) by adding the missing substances in the form of manure; (3) by rotation of crops. A class will easily see that manure should have some relation to the next crop; thus clover needs a lot of lime, turnips call for potash, wheat needs phosphates and silica, and so on. Rotation of crops, again, depends on the fact that different crops exhaust the soil in respect of different substances, so that by a suitable choice the land gets rest in respect of the first drain while endeavouring to meet the second. This may be illustrated by the "Norfolk course"—turnips, barley, clover, wheat. An examination of the ash of these plants shows that turnips remove soda, potash, phosphorus, sulphur, chlorine; barley, the second year's crop, needs little of these, but lots of silica; clover takes much lime and magnesia, and very little phosphorus and potash; lastly, wheat resembles barley in using a great deal of silica.

These are farming methods of repairing exhaustion of soil. How does nature act? Some plants leave the soil by runners, creeping stems, and the like, so as to break new ground; others have winged or other wind-borne seeds, which fall at some distance from the parent plant. And then nature also has a rotation of crops, though the round is a long and slow one. Every one must have noticed that cowslips, say, are no longer found in places where they used to be plentiful, apart altogether from human interference; and that, *per contra*, certain plants are becoming common, though they were scarce a few years ago.

In order to test the phenomena of feeding and drinking by the roots, the method of water-cultures is recommended. It is difficult to uproot a plant even from loose soil without breaking, if not the root, at least the root-hairs; damp sawdust is more satisfactory, but even then the plant cannot well be replanted; but the method of culture solutions offers several advantages, not the least of which is the visibility of the process in all its stages. Get some pickle-bottles with corks, and cut a side slit in the cork wide enough to admit the stem of a germinating pea or bean; then half fill the bottle with the culture solution in question, so that the roots will dip into the liquid. One of the best solutions for this purpose is given by Sachs:—

Potassium nitrate (saltpetre),	1 gram	In 1 litre (1000 grams) of water.
Calcium sulphate (plaster of Paris),	½ ,,	
Magnesium sulphate (Epsom salts),	½ ,,	
Calcium phosphate (bone-ash),	½ ,,	

In order to keep down the growth of algæ, which would soon coat the glass with a greenish-brown scum, a roll of black paper should be slipped over the bottle. It will be observed that the above solution contains no iron, and that plants grown in it show yellowish leaves, as if they had been grown in the dark. Set up two similar cultures, but add in one case a single drop of ferric chloride (Fe_2Cl_6), when it will be found that the leaves assume their natural green colour. Chlorophyll, the green colouring matter of leaves, therefore demands a small amount of iron; its call for sunlight may be shown by "etiolating" a plant—growing it in the dark—when it forms long, lanky shoots pale yellow in colour. Many interesting experiments may be made with such cultures, such as keeping out nitrogen, adding a pinch of salt to imitate the effect of the sea and salt marshes, and so on; or the potassium may be withheld from such "potash plants" as coffee and potato, always keeping a normal culture for comparison.

Since ordinary soil water contains very little solid matter in solution, there must be a passage of water through a plant, and a means of arresting the solids while getting rid of the surplus water. This is the "transpiration flow" upwards from the roots to the leaves; the solid matters are absorbed *en route*, and the unused water excreted by the lower surface of the leaves. Root-pressure may be demonstrated in various ways. Examine the blades of grass in the morning, and drops of water will be found at the points of the leaves. This was formerly mistaken for dew, but it is not dew; the water in question has been absorbed from the earth, and collects at the ends of the leaf-veins. Tropæolum, commonly called nasturtium, shows this very well; indeed, almost any plant kept in the house will do. Hales devised an experiment to show this rise of water. He cut a vigorous vine close off at the root, and inserted the cut stem into a wide glass tube filled with water, rendering the joint air-tight by a small piece of indiarubber tubing. The lower end of the glass tube carried an indiarubber stopper fitted with a long, thin glass tube which dipped into ink or other coloured liquid. On supporting the cut plant in its natural position, the upward suction of water was readily seen by the rise of the ink in the capillary tube, a rise amounting to eighty feet in the case of a healthy vine.

Another means of showing root-pressure is to use the stump which remains in the soil, and by means of an indiarubber tube connect this with a glass tube supported horizontally. Fill the tube with water, and by squeezing the indiarubber encourage a small air-bubble to appear in the glass tube. As the root-pressure shows itself, this air-bubble will, of course, be driven away from the root. The experiment may also be shown by cutting across a hyacinth stem after flowering, so as to see the "bleeding" which ensues. A young tree stem or branch shows a similar loss. The bleeding seen on warm days is not all caused by root-pressure, but partly by the expansion of the internal liquid due to the sun's heat, and it may be imitated by heating some green wood before the fire.

Mariotte's experiment is useful for showing absorption of water by the leaves. Cut off a small branch with two leafy twigs, and lay it with one of these twigs immersed in a basin of water and the other outside: the whole branch continues green for a while, showing a circulation of water from the wet leaves to the others.

It is very easy to show transpiration by leaves. Place a bell-jar or propagating-glass over any growing plant, and the interior will become quite wet from this cause. To make sure that the water is not coming from the soil, cover this up with glazed paper, lead-foil, or other waterproof material. To discover which side of a leaf removes the surplus water, one or two easy experiments may be made. Arrange a plant near a window so that the glass faces the upper surface of one leaf and the lower surface of another. If the day is cold, moisture will be found on the pane opposite the under surface of the leaf. Or a piece of glass may be hung among the leaves of a vine or other large-leaved plant, so as to oppose the upper surface of some leaves and the under surface of others. A chemical method is very striking. Take some cobalt chloride or nitrate—a pink solution—and soak in it some blotting-paper; then bake this before the fire till the colour changes to dark blue. Fasten pieces of this to the surfaces of leaves, and it will be found that those attached to the under surface are the first to turn pink by absorption of water-vapour from the leaf.

Many experiments may be made on this transpiration flow; the effects may be studied of removing a number of leaves, varnishing them, giving them more or less light, giving the whole plant more or less water, and so on. Take a vigorous hop or sunflower, or other plant which uses much water; water it, but not to excess; then place the whole plant, pot and all, in a balance, and expose it to sunshine. A sunflower, under favourable conditions, will lose twenty ounces of water in twenty-four hours, showing a rate of "perspiration" seventeen times as much as our own.

At this stage the appliances for checking too rapid a loss of water may be mentioned, in the form of cork, wax, hairs, down, form and arrangement of leaves so as to lessen their surface—for example, the rolled leaves of lily of the valley, the green switch stems of broom, the thick skin of cactus and "American aloe."

Closely connected with transpiration is respiration—the elimination of the waste products of combustion, chiefly carbonic acid and water, as in our own case. Wherever heat is produced these waste products are formed, and they must be removed as fast as possible. Respiration goes on night and day in plants as well as animals, but in the daytime it is masked by assimilation. Carbonic acid is both taken in by the green leaves and excreted by them. To get rid of this, avoid using leaves, and work with seeds or flowers. Into a wide-mouthed bottle put some daisy buds without their green involucres, and also some lime-water in a small crucible or watch-glass. Cork tightly, and observe how the lime-water turns milky from formation of carbon dioxide. Fill a large test-tube with mercury over a trough of the same, and slip into it some germinating peas, taking care to admit no air; then support the tube vertically for a day. A small amount of carbon dioxide gathers at the top, and this may be absorbed by introducing a small piece of caustic potash the size of a pea, when the mercury rises to the top.

Assimilation of carbon dioxide from the air, and its subsequent formation into starch, sugar, oils, etc., is also easily shown, at any rate in its early stages. Take any vigorous green plant like mint, or, preferably, a water-plant like the Canadian pondweed (*Elodea canadensis*), put it in a wide bottle full of water, and invert the whole in a saucer of water, then allow it to stand in the sun. Bubbles of a gas are evolved, and this, on being tested, turns out to be oxygen. Reference has already been made to the formation of chlorophyll—the green substance chiefly concerned in this assimilation—and to the way in which it is affected by sunlight and the presence of iron in the soil. A few experiments on starch-formation will be found useful.

Boil some starch, and when cold add a drop or two of iodine solution. A blue colour is the result, due to iodide of starch; and this test for starch may be used anywhere. Take a fresh leaf and dip it into boiling water, then place it in spirits of wine. This removes the chlorophyll, which is not affected by water; and when all the green colour has disappeared, take out the leaf and add iodine solution. A blue coloration shows the presence of starch. Try this with a variegated elder, variegated geranium, or a leaf of the white and green aspidistris, often grown as a school or house plant, and it will be found that starch occurs only in the green portions; no chlorophyll, no starch. Still more instructive is the following experiment:—Take an evergreen (elder) or other vigorous plant in a pot, and at the close of the day remove one of the leaves and put it into hot water, then into spirit as usual. At the same time remove another leaf, but lay it on wet blotting-paper on the soil, and then put the whole plant into a dark press for the night. Next morning put this second leaf into spirit, as well as a third leaf freshly cut, and test all three for starch. Number one, cut the previous afternoon, will show abundance, since the starch has not been allowed to escape down the veins into the stem. Number two, left on the blotting-paper, also shows a fair amount, but in this case there is a crowding of starch into the veins and midrib; while number three, cut after being all night in the dark, shows this crowding into the stem in very marked degree, scarcely any starch being left in the leaf.

Numerous little class experiments may be devised on these lines. Little tinfoil masks may be gummed on leaves, one every day, and the whole series tested for starch at the end of a week. In connection with the transference of starch to the stem, attention should be called to its storage there and in roots, tubers, swollen leaves, etc., and to the manner in which men draw upon these stores for starchy foods, as exemplified by rice, sago, tapioca, arrowroot, potato, cereals, etc.

GENERAL PHYSICAL GEOGRAPHY.*

BY A. J. HERBERTSON, PH.D.

IT is usual to divide general geography into three great divisions—(1) Physical, dealing with inorganic forms; (2) Biological, dealing with organic forms; and (3) Anthropological, dealing with man. This is convenient and useful, as long as it is borne in mind that all three divisions coexist.

Shape and Size of the Earth.—Many considerations have led men to conclude that the Earth is a great ball.

1. The funnels, masts, and, finally, only the smoke of a receding steamer are seen after the hull has disappeared, as would be the case if the surface of the Earth were curved.

2. The horizon at sea dips at the same angle below a plane surface all round, which shows that this must be part of some regular figure, such as a sphere.

3. Ships which have sailed round the world have found these two phenomena occur everywhere, so that the world must be approximately spherical.

4. The shadow of the Earth seen on the Moon during a lunar eclipse has a circular outline, and therefore the Earth must be some regular figure, such as a cone or a cylinder or an ellipsoid lying in a favourable position, or a sphere.

5. If three poles are set in a line at equal heights above a canal or other level surface, a sight taken between the tops of the two end ones shows the top of the middle one is above the line of sight.

6. Measurements of the height of the pole of the heavens above the horizon increase from equator to pole proportionally to the distance travelled along a north or south line. This proves the Earth to be almost a perfect sphere.

7. Careful measurements of the lengths of arcs subtending equal angles with the pole of the heavens show that there is a slight deviation from the spherical form. The arcs are longer nearer the poles, where the curvature is therefore not so great as at the equator.

8. An oblate spheroid approximates more closely to the shape of the Earth than a sphere. This is the shape which a somewhat elastic solid rotating about an axis would assume.

9. Were the Earth a homogeneous sphere, the force of

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gravity would be constant, and a pendulum swinging once per second would be the same length at all parts of its surface. This is not so on the Earth's surface, for the seconds pendulum requires to be longer nearer the poles than at the equator, where it is therefore farther from the Earth's centre of gravity. The calculated values are :—

Latitude.	Length of Seconds Pendulum.	Value of Gravity.
0°	39·02 in.	32·09 ft. per sec. per. sec.
45°	39·12 ,,	32·17 ,, ,,
90°	39·22 ,,	32·26 ,, ,,

10. Pendulum determinations show that the Earth is not exactly an oblate spheroid, and geodesists call the Earth a geoid, which merely means that it has a shape of its own. The geoid has been defined as "the figure formed by the envelope of surfaces normal to the plumb-line ;" but this is neither very precise nor useful.

11. For most practical purposes the Earth may be assumed to be a sphere, whose circumference is approximately 25,000 miles, or 40,000 kilometres, and whose diameter is 7,900 miles, or 500,000,000 inches, or 12,750 kilometres.

12. If closer approximations are required, it may be considered an oblate spheroid with the following dimensions :—

Equatorial diameter.	7,926 miles.	12,755 km.
Axial diameter	7,899 ,,	12,712 ,,
Flattening	$\frac{1}{299 \pm 5}$	
Equatorial circumference	24,899 ,,	40,070 ,,
Meridional circumference	24,857 ,,	40,003 ,,
Length of 1° along the equator..... ..	69·2 ,,	111·3 ,,
Length between 0° to 1° of latitude.	68·7 ,,	110·56 ,,
Length between 89° to 90° of latitude....	69·4 ,,	111·68 ,,
Mean length of 1° of latitude	69·0 ,,	111·12 ,,
Superficies	197×10^6 sq. miles.	510×10^6 sq. km.
Volume.....	260×10^9 cub. miles.	$1,083 \times 10^9$ cub. km.

The following table of approximate values of lengths of a degree of longitude at different latitudes is easily remembered :—

At lat. 0° one degree of long. is 69			miles (*cf.* actual value, 69·2 miles).				
,, 10°	,,	,,	$69 - 1^2 = 68$	,,	,,	,,	68·1 ,,
,, 20°	,,	,,	$69 - 2^2 = 65$	,,	,,	,,	65·0 ,,
,, 30°	,,	,,	$69 - 3^2 = 60$	,,	,,	,,	59·9 ,,
,, 40°	,,	,,	$69 - 4^2 = 53$	,,	,,	,,	53·1 ,,
,, 50°	,,	,,	$69 - 5^2 = 44$	,,	,,	,,	44·6 ,,
,, 60°	,,	,,	$\frac{1}{2}(69) = 34\frac{1}{2}$	,,	,,	,,	34·7 ,,
,, 70°	,,	,,	$\frac{1}{3}(69) = 23$	,,	,,	,,	24·1 ,,
,, 80°	,,	,,	$\frac{1}{6}(69) = 11\frac{1}{2}$	,,	,,	,,	12·1 ,,

A sphere is the solid which contains the greatest volume within the least surface. In a thin lamina the ratio of volume to surface is much less. The Earth is supposed to be slowly contracting, its volume diminishing proportionately more rapidly than its surface. Some writers consider that the Earth shows signs of a slightly tetrahedral deformation from a sphere. The continents would represent the edges, the oceans the faces, of the incipient tetrahedron. (See *Geographical Journal*, Vol. XIII. (1899), pp. 225–251.)

The Outer Layers of the Earth.

Land and Water.—The land is the outer layer of the lithosphere. Dry land, or simply land, when used in opposition to water, signifies that portion of the surface of the lithosphere in direct contact with the atmosphere. Water is the upper surface of the oceanic waters in contact with the atmosphere.

Only about two-sevenths of the Earth's surface consist of dry land. The remaining five-sevenths are covered by water.

More exact figures are: land, 55,800,000 square miles (144,500,000 square kilometres); water, 141,100,000 square miles (365,500,000 square kilometres); or land, 28·3 per cent. ; water, 71·7 per cent.

The hemisphere whose vertical radius lies in Brittany (or in the Eastern Pyrenees) is almost half land and half water (12 : 13). The complementary hemisphere contains only one-fourteenth land and thirteen-fourteenths water (5 : 72).

The northern hemisphere has a much larger proportion of land than the southern. This is of the greatest geographical importance. If, however, we consider the sum of land and water along similar parallels, both north and south of the equator, we find a more constant relationship, for the land varies from 23 to 37 per cent. of the water.

The ocean forms a continuous surface, broken here and there by masses of land projecting above it. These islands, as all masses of land surrounded by water are called, are of many shapes and sizes. The largest, the continent-islands, are the Old and New Worlds, Australia, and Greenland.

Old World.....	20,850,000 sq. miles.	79,900,000 sq. km.
New World	14,525,000 ,,	37,620,000 ,,
Australia	2,935,000 ,,	7,600,000 ,,
Greenland.....	*ca.* 835,000 ,,	*ca.* 2,160,000 ,,

The land mass of Antarctica, which may be one vast island or an archipelago, is estimated, if the former, at three and a quarter million square miles (eight and a half million square kilometres).

The water is divided by the land into three well-marked areas, commonly spoken of as oceans,—

The Pacific Ocean, separating the Old World and Australia to the west from the New World on the east ;

The Atlantic Ocean, between the New World on the west and the Old World on the east ; and

The Indian Ocean, south of the Old World and west of Australia.

The southern parts of the great oceans are separated by conventional boundaries—lines drawn due south from the southern points of the Old and New Worlds and of Australia (Tasmania).

The oceans are sometimes further subdivided by considering the part bordering the North Polar lands as the Arctic Ocean, and that bordering the South Polar lands as the Antarctic Ocean. These are even more artificial than the other ocean boundaries, all of which are conventional.

The great land masses may be divided into well-marked areas, called continents. The Isthmus of Suez almost cuts off Africa from the more compact mass of Eurasia, which is again somewhat arbitrarily divided into Europe in the west and Asia in the east. The New World is divided by the narrow Isthmus of Panama into North and South America. Australia is also regarded as a continent.

It will be seen from the map that the term continent is used in a somewhat arbitrary way, and that, at least in the case of Eurasia, it is very much open to criticism. Accepting it for the present, it may be noticed that three of the six continents are wholly in the northern hemisphere—North America, Europe, and Asia ; and three are in part or wholly in the southern hemisphere—South America, Africa, and Australia. Antarctica is isolated from all the other land masses, which are more compactly grouped. It is remarkable that scarcely any land is found at the antipodes of any of the great land masses.

Vertical Distribution of the Land.—The surface of the ocean is taken as the zero line from which the vertical position of points on the land is measured.

The greatest height above sea-level yet determined is 29,000 feet—the height of Mount Everest (Jomokang-kar) in the Himalayas. The greatest depth yet sounded below the surface of the ocean is 31,000 feet, immediately east of the Kermadec Islands.

The average height of all the land (2,300 feet) is small compared with the average depth of the ocean (11,500 feet) —five times as much. The volume of land above the sea-level is thus 24,250,000 cubic miles, or only one twenty-second of the volume of ocean waters—533,000,000 cubic miles.

If there were no water on the Earth's surface, and all the land were to be levelled, the mean level of this resulting solid spheroid would be 7,550 feet below the present sea-level. If the water were spread uniformly on the top of this, it would be 8,200 feet deep.

The mean elevation of the Old World (2,365 feet) is greater than that of the New (2,230 feet), and both are much higher than Australia (1,310 feet).* Of Antarctica we know next to nothing.

The Continental Block and Oceanic Space.

At about 600 feet below the sea-level the curve of the crust suddenly becomes sharper. As a rule, the ocean floor

* Figures from Wagner's *Lehrbuch der Geographie*.

slopes rapidly from −600 feet downwards, although in some places this steep slope begins at less depths, and others at greater ones. The contour line of −600 feet may be approximately taken as the line dividing the continental block from the ocean depths. It has been well called the continental edge. Above 5,000 feet there is very little land, and below −16,000 feet there is very little sea. These regions form respectively the crest of the continents and the deeps of the ocean. Both above the ocean deeps and above the continental edge the section line has the same shape—flat at first, and becoming gradually steeper. The flat part, between −16,000 and −10,000 feet, forms the ocean beds, and the steeper part, from −10,000 to −600 feet, the ocean slope (Oceanic Actic Area). The flat part, between −600 feet and 600 feet, forms the continental base, and the steeper part, from 600 feet to 5,000 feet, the continental slope (Continental Actic Area).

We can now classify the continental masses and oceanic spaces as follows:—

20,000 feet		
	Crest of the land.	High land.
6,000 feet		
	Body of the land.	
600 feet		Low land.
	Base of the land.	
0 feet	Strand. Reference sea-level line.	
	Continental waters.	
−600 feet		
	Waters over the slope.	
−10,000 feet		
	Deep waters.	
−16,000 feet		
	Abyssal waters.	
−31,000 feet		

Comparison of the Continents.—Looking at the land masses from a structural point of view, the southern continents have to be clearly distinguished from the northern ones, from which they are separated by a belt of lower elevation, which we may term the Mid-World Depression. This depression is seen in the seas between North and South America, above which rise Central America and the West Indies—the American or Occidental Mediterranean. It is obvious in the Mediterranean proper, severing Europe from Africa, and is found in the waters round the Malay Archipelago—the Asia-Australasian or Oriental Mediterranean. The connection between the last two is traced in the depressions of Mesopotamia and the Persian Gulf and the Indo-Gangetic plain.

The lands south of this line differ greatly in their characteristics from those to the north, for they are mainly true table-lands of more or less horizontal rocks, fringed in east and west with folded mountains, which are traceable also in the extreme south as well as in the north, and form a framework to the whole area.

The Andes skirt the west of South America, rising to great heights out of very deep waters to the west, so that the difference in level between mountain crest and oceanic deep is greater in a short distance here than elsewhere, and amounts to over 8¾ miles. The Andes curve eastwards both in the north and in the south, where it is possible that South Georgia and Graham's Land represent their prolongation. Plains under 600 feet above sea-level skirt the eastern base of the mountains, and the land gradually rises to the Guiana and Brazilian plateaus in the east, few parts of which rise above 6,000 feet, and these not far from the coast.

Eastwards across the Atlantic, in the centre of which a broad submarine plateau runs from north to south, rises the table-land of Africa, undisturbed by foldings save in the Atlas in the north, and in the Zwartebergen and Langebergen bordering the south coast. The table-land rises sharply above the coast, which is bordered by a very narrow shelf and plain, and slopes gradually from west to east, where most regions over 6,000 feet are found.

In Madagascar, Arabia, and the Dekkan we can trace a continuation of this table-land, whose eastern part is the much lower plateau of Australia. Here, as in South America, the table-land gradually slopes to a lowland, separating it from a range of old folded mountains, the great dividing chain of Eastern Australia. This must be looked upon as only the eastern chain of a partly-submerged mountain system, whose outer and most important ranges can be traced in New Guinea, New Caledonia, and New Zealand.

There is thus a certain unity about the land masses south of the Mid-World Depression.

The northern land masses are more complicated, and the New World differs from the Old in its orientation, unless we consider the mountainous islands of Eastern Asia the homologue of the Cordilleras of North America, and the Antillean chain the homologue of the vast folded mountain system of Southern Europe and Central Asia.

In North America the recent folded mountains lie in the west, and are separated by low-lying plains from the older folded mountain systems, now greatly degraded, of the Appalachian and still older Laurentian systems.

In Eurasia the recent folded mountains lie in the south, north of the Mid-World Depression, and may be called the Mid-World Mountain System. They are skirted by older mountains, greatly worn down, bounded by vast plains to the north. To the north-west of the plains are the British-Scandinavian Highlands, which were a great fold-mountain system at an early period, probably the same as that of the Laurentian system. It has even been suggested that the north of Europe and America were once one, when a continental area occupied the site of the northern part of the Atlantic, of which Greenland and Iceland, and the submarine plateaus connecting them, are the remains. To the north-east and east are the Highlands of North-Eastern and Eastern Asia.

AREAS OF OCEANS AND LENGTHS OF COAST-LINE.

(Excluding portions south of Antarctic Circle.)

Ocean.	Area.		Coast-line.	
	Sq. miles.	Sq. km.	Miles.	Km.
Pacific	68,120,000	176,425,000	490,000	790,000
Atlantic	40,120,000	103,925,000	884,000	1,423,000
Indian	28,270,000	73,225,000	251,000	404,000

OUR ILLUSTRATED GEOGRAPHICAL NOTEBOOK.

AFGHANISTAN OF TO-DAY.

THE political importance of Afghanistan in relation to the safeguarding of British interests in India far outweighs any considerations engendered by the people, productions, or the commercial possibilities of the country. It is an excellent example of the "buffer state." Russian encroachment has reached the northern borders of the country, and British territory abuts on the southern and eastern boundaries; but the Afghans have implacably resisted the nearer approach of Western civilisation—a resistance strengthened by every consideration of self-interest, heightened by inherent differences of race and creed.

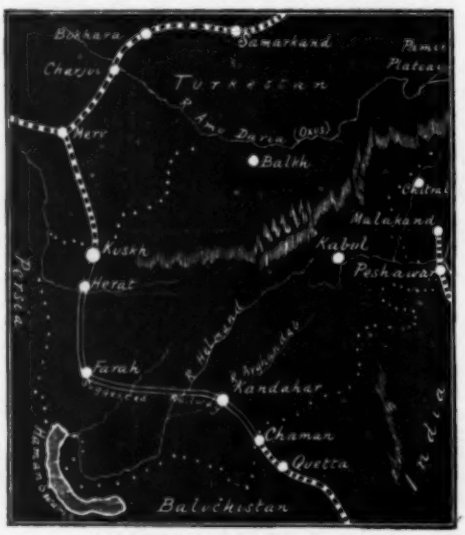
The Country and its Productions.—Of its area of 240,000 square miles quite four-fifths is made up of wild mountainous regions and arid plains. Fertile valleys are the exception rather than the rule, and the general aspect of the country is forbidding in the extreme. Of the rivers the most important is the Kabul, a highway into India, where it falls into the Indus at Attock. The climate varies from intense heat in the south-west to the rigorous winters of the Hindu Kush plateaus.

The chief natural vegetable productions are the castor oil plant and a plant which yields asafœtida. Tobacco succeeds in many districts, the best being that of Kandahar. Herat is the centre of the richest agricultural district, where wheat, barley, cotton, the grape, and mulberry flourish exceedingly. The country is supposed to be rich in minerals, but only a little iron and lead are worked. The domestic animals are the horse, camel, cow, and sheep. The camel is more compact than the Indian species. The horses, though of a poor class, except those from the Turcoman frontier, are exported to India in large numbers. The nomadic tribes count their wealth in sheep; mutton is the chief animal food of the people; joints of meat are treated with salt and dried in the sun for winter use. The native industries are chiefly weaving

(silk and carpets) for domestic use, and the preparation of sheepskins, which are then called *postins*. The long wool is allowed to remain, and the skin is tanned a yellow colour. This material is largely used for the winter clothing of British Indian irregular troops.

Trade.—Navigable rivers are almost non-existent, and wheeled vehicles are almost unknown; consequently all transport is by beasts of burden—the camel and the horse. The tortuous valleys, the almost impassable defiles, and the dreary deserts are traversed by strings of camels carrying merchandise between Kabul and Scinde or Herat, and even distant Samarkand and Bokhara. The value of the trade with India is estimated at about £800,000 per annum. A large transit trade between India and Central Asia is prevented by the repressive trading restrictions of the Ameer, an example of which is shown in a duty of 106 rupees imposed on every camel-load of Indian tea passing through Kabul to Bokhara.

History.—In the early part of the eighteenth century Herat and Kandahar were in the possession of Persia, but by 1773 Timur Shah was ruling over a definite Afghan empire which included a portion of the Punjab and the whole of Kashmir. In 1839 it was deemed necessary to dispatch a British expedition to Kandahar. A new ruler



RAILWAY MAP OF AFGHANISTAN.

was seated on the throne, and the British army withdrew, leaving only a force of eight thousand to assist in settling the country. In 1841 a revolt against the new authority broke out, and the British force was practically wiped out of existence. Another expedition entered Afghanistan, dismantled various strongholds, and destroyed the citadel of Kabul. By the time of the Indian Mutiny British and Afghan relations were such that the Afghan ruler was able to prevent his turbulent subjects from taking advantage of the situation. In 1878 England once more declared war, and Kabul was again occupied, where a British envoy and escort remained after peace was declared. The following year the envoy and his followers were treacherously massacred, after which Sir Frederick Roberts entered the country with a considerable army, and during an arduous campaign inflicted severe defeats upon his wily foes. Since that time there has been no need for offensive measures, and the Ameer has been friendly, even though the intercourse has not been marked by the desired degree of cordiality.

People.—The population of the country numbers about four millions, and consists of numerous more or less distinct and almost independent tribes. The average Afghan is handsome and athletic. Agriculture and soldiering are the chief occupations, and though comparatively a few people engage in trade, no native possessing a spark of national pride would sink to the level of keeping a shop. On the surface he is apparently frank, open-hearted, and hospitable; but this engaging demeanour is but a crafty assumption to cloak a character marked by all that is cruel, avaricious, selfish, and revengeful. The national character is well summed up in the statement that "nothing is finer than their physique or worse than their morale."

Government.—The government is monarchical, under a hereditary sovereign, but the power of the ruler very much depends upon his strength of character and the length of his purse. Each separate province is ruled by a *hakim* or governor, who in turn delegates authority to nobles and others. Very frequently corrupt methods of local government are adopted, in which chicanery and spoliation are important factors.

There are no reliable statistics of the Afghan army, but it is believed to number about 45,000 men, with over 300 guns. At Kabul is an arsenal, where, under the guidance of Englishmen, with machinery imported from England, 20,000 cartridges and a dozen rifles can be turned out daily.

Russian and British Aims.—The Russian Empire in Central Asia is coterminous with the northern boundary of Afghanistan. The frontier, especially in the neighbourhood of Kuskh, was demarcated by commissioners of Russia and Britain, and any violation of this frontier by Russia would be strongly resented by the British.

On the Indian frontier is Chaman, the most advanced outpost of the Indian railway system. The demarcation of the frontier at this point was settled by the British Government and the late Ameer. If the British violated this frontier, Russia would possess no valid right to object, especially in face of the fact that the Ameer is openly an ally of Britain, receiving from the Indian Government an annual subsidy of 180,000 rupees.

Between Kuskh and Chaman there is but an intervening space of 438 miles, and at each of these points there are accumulated immense reserves of railway material. Whether the suggested railway will be constructed, at least in the near future, is extremely doubtful. Projects are afoot for bringing the Transcaspian railways into direct touch with those of European Russia, but the line to Kuskh loses much of its strategic value so long as no railway traverses Afghanistan.

The recent death of the Ameer, Abdur Rahman, has drawn public attention to the important part Afghanistan plays in the respective policies of Russia and Britain in Asia. Fortunately the new Ameer has been carefully trained by his astute parent, and he is believed to be keenly alive to the possibilities of the situation—a situation from which he may be able to gain many material advantages for his country without endangering its independence.

HOW TO COMPILE NOTES OF LESSONS.

By T. Hudson, *Head-Master of Kepler Board School, Leeds.*

III.—A DICTATION LESSON.

Remarks on the Dictation Lesson (*see November number*).

The notes might almost be headed, "How *not* to give a Dictation Lesson." In the first place, they are notes, not of a dictation lesson merely, but also of a spelling lesson. The piece to be dictated should not be prepared in the same lesson; it should be a *test* of spellings learned in previous lessons. Neither should it (as a rule) be given as it occurs in the reading book, but suitable extracts from various paragraphs should be given, and words to which special attention has been directed should be introduced, so as to make the piece a real test of preceding lessons.

Every efficient teacher will keep a list of common and oft-recurring words which his scholars often spell wrongly. Some of these should always be put in, as it is only by frequently writing them that they will be eventually mastered. This, and not the triple repetition recommended under (3) of the notes, is the method by which difficulties in spelling will be overcome.

It is time wasted to write the whole piece out on the blackboard. In the lesson we are considering, this is only done for the purpose of spelling *each* word three times. Though the notes lead us to infer that even such words as "the," "to," "be," etc., are to be spelt three times, I think it is intended that only the underlined words should be thus spelt. Even if this simultaneous spelling were to be commended, it would surely be better to write only the hard words. But, as stated before, this should not be done in the dictation lesson. Neither should spelling rules be taken. Their proper place is the spelling lesson. If the word "dropped" were spelt wrongly, then, *after correction*, the class might be asked how it is wrong; but the teacher should not go through several spelling rules *before* dictating the piece.

The notes should show what position the teacher intends to take in front of the class, and how many times the phrases are to be given out. The position must be such that the teacher can see every child, and he must on no account go among the scholars to look after the writing. Bad writers should be in the front line, and bad writing should be dealt with when the books are corrected.

The correction of mistakes is the weakest part of the lesson. I agree with the method of letting children above Standard II. mark their own books, but the lesson in question fails in that there is no provision for the teacher's supervision. Every book should be examined by the teacher, to see if there are any unmarked errors or careless writing. If the piece is written badly, the scholar should be made to write the whole or a part out again. In this lesson the teacher seems to think it is of greater importance to count the number of mistakes than to see that all the mistakes are corrected and *written out in the books two or three times correctly*.

Note.—Since writing the above, by the courtesy of the Editor I have been permitted to read the criticisms sent in. I find opinion much divided concerning the method of marking the books. Many seem to think that it is better for the scholars to change books. That was the method I used to adopt, but for several years now I have let the scholars mark their own. I find that they mark their own much better than they mark another scholar's book. The method of marking is, after all, only a small matter of detail. If the books are exchanged, the teacher's supervision is just as necessary.

CRITICISM COMPETITION.

PRIZE AWARD.

Some of the criticisms sent in are exceedingly good, and it has been by no means easy to select the best from among several excellent papers. After careful consideration, however, the prize of ten shillings and sixpence has been awarded to

Mr. JAMES CAMP, Board Schools,
Edgware, Middlesex.

Special commendation is due to "Rollo," "Goolite," "Regis Discipius," "Electra," "Hope," and "Donro" for the excellent criticisms sent in.

NOTES OF A DICTATION LESSON.

Class—Standard III.
Time—30 minutes.

Preliminary.—Books, pens, etc., to be in readiness.

The Test.—Selections from *Royal Crown Reader*, pp. 156, 157, 158.

* Cattle | eat the.....green, | juicy.....leaves. | .....The seed contains | a great deal of nourishment | in a small bulk. | .....All over the world | .....men have sown | certain kinds | of grass. | .....[It grows on hills | and in valleys. |] Men cut it down | by scythes | and reaping machines. |

Dictating.—After reading the piece once through, give out in portions as marked, *once*, standing in front of class towards the left, and sufficiently far back to take in the whole of the front row. Keep an eye upon the slowest writer, but do not keep the class waiting too long for one scholar. Call the names of those sitting in a bad position or holding pen wrongly.

Correction.—Scholars mark their own books.

Teacher should *spell* all words that can possibly be got wrong, but only *say* the small ones. Call special attention to the omission of "e" in juicy and unchanged "y" in valleys. Write the harder words on blackboard as they are spelt, to serve as a copy for the scholars who have to write them over correctly. All alterations must be counted as mistakes. Let scholars put in the margin opposite the last line of writing how many mistakes they have.

Dealing with Errors.—Scholars write out correctly the words spelt wrongly, filling a line with each mistake.

Let all correct show hands, and teacher glance rapidly over the work. If satisfactory, let them write out some difficult words, which should be kept ready on a portion of the blackboard. Then overlook those with one mistake. Hear each child spell the word, and see that it is written correctly at the end of the dictation Proceed in the same way with two or more errors.

Note the mistakes, and at the beginning of next spelling lesson see that they are again taken; also draw attention to them when they occur in subsequent reading lessons.

* The spaces show where alterations have been made. The piece in brackets has been introduced to test the word "valleys."

A COURSE OF OBJECT LESSONS FOR GIRLS' SCHOOLS.

BY WILLIAM DONE, B.A.,
Head-Master of Brighton Pupil Teachers' School.

XVI. HEAT AND TEMPERATURE.

Articles of Illustration.—Spirit-lamp or gas-flame; glass flask with cork; piece of thin glass-tubing; three basins; kettle of boiling water; a needle and pair of pincers; a beaker, or small tin can; a mercurial thermometer which can be placed in hot water.

EXPERIMENT AND OBSERVATION.	RESULT OR INFERENCE.
Take some cold water; pour a little into the beaker or can to heat over the flame. In a few minutes let one of the girls place one hand in the cold water, and the other in the water which is being heated.	The water in the beaker over the flame is warmer.
Pour a little boiling water into some cold water until the mixture is fairly warm. Call another girl to place her hand in the warm water.	It has got its heat from the flame, and if we left it long enough it would get very hot, and eventually boil.
Call the girls' attention to the length of time which elapsed while the water in the first experiment was getting warm over the flame. Hold a needle in the flame by means of a pair of pincers or a piece of wood.	The boiling water has parted with some of its heat to the cold water, as in the former case the flame gave up some of its heat. Heat can pass from one substance to another. The needle becomes red-hot almost immediately, yet the total amount of heat it possesses cannot be anything like the total amount of heat possessed by the warm water, which received the heat from the flame for a much longer time. The terms *hot* and *cold* do not, therefore, refer to the quantity of heat bodies have, but only to the *state of a body at a particular time*.
Refer to the second experiment in the lesson, where the boiling water was poured into some cold water.	The result was that the boiling water parted with some of its heat—that is, heat went from the hotter body to the colder one until the resulting mixture was neither boiling nor cold. [Teacher to add that this state of a substance, by which we judge whether it can either give or receive heat from another substance, is called its *temperature*.]

Experiment and Observation.	Result or Inference.
Ask what other words we could use instead of the terms *hot* and *cold*.	By *hot* we mean at a high temperature, and by *cold* we mean at a low temperature.
Take some hot water in one basin, and some lukewarm water in another basin. Let a girl place one hand in each basin.	We can tell distinctions in temperature by means of our sense of touch.
Take another basin of cold water. Let the same girl place one hand in the hot water, and the other hand in the cold water, and after a minute or so withdraw the hands and place both of them in the lukewarm water.	To the hand which was in the cold water, the lukewarm water feels warm; to the hand which was in the hot water, the lukewarm water feels cold. Plainly our feelings are not good guides as to differences in temperature.
Fill a glass flask completely with coloured water. Through the cork pass a thin piece of glass-tubing. Press the cork into the flask, so that a little of the water mounts a short distance up the tube. Place the flask above the flame, and note result.	The water rises up the tube. The heat applied to it has caused it to take up more room.
	If all substances got larger by being heated, we could perhaps tell something of their temperatures by measuring by how much they had increased.
Show a thermometer; let the girls notice the level of the liquid. Place it in some warm water, and observe again.	The quicksilver in the thermometer rises up the tube in a similar manner to the water in the former experiment.

XVII. THERMOMETER.

Articles of Illustration.—Two mercurial (Fahrenheit) thermometers, and one containing alcohol; a piece of glass-tubing with a narrow bore, having a bulb blown at one end; two flasks; spirit-lamp, and a little ice; some mercury.

Experiment and Observation.	Result or Inference.
Fill two flasks with cold water. Place a thermometer in each, and let the girls notice that the quicksilver stands at the same level in both tubes. Place one flask over the spirit-lamp, and call a girl to watch carefully the mercury column of the thermometer in this flask.	The water in both flasks was at the same temperature, but as soon as one flask was placed above the flame a difference began to be seen.
As soon as the mercury is seen to rise, remove the flask from the lamp. Let a girl hold one finger in the water of one flask, and one in the other flask.	The water, becoming warm, communicated its heat to the mercury; and the mercury rose in the tube, because it took up more room.
	The difference in the temperatures is not apparent to our feelings, so we see that thermometers are more useful in testing temperatures than our hands would be. A thermometer is very sensitive to heat.
Show a piece of glass-tubing with a very fine bore, and having a bulb blown at one end. Compare with the tube and bulb in a thermometer.	The bulb is the reservoir of the quicksilver. The tube is made with a fine bore, so that a little expansion of the quicksilver may be shown over a good space of tube.
Let a girl try to pour some mercury down the piece of glass-tubing.	The bore of the tube is so narrow that we cannot get the mercury down.
Heat the bulb over the spirit-lamp, then invert the tube and place the end in a cup of mercury.	Some of the quicksilver goes apparently of its own accord up the narrow bore. [Teacher to help the girls to reason that by heating the bulb some of the contained air was driven out; the remaining air cooling down when the bulb was taken from the flame caused a partial vacuum, which the mercury at once occupied.]
Repeat the experiment.	Yet more mercury goes up the tube. Plainly we could practically fill the bulb and tube by this process.
Ask whether we require to completely fill the bulb and tube.	If the tube and bulb were completely filled, there would be no room for expansion in case the thermometer were subjected to a higher temperature.
Tell the children that the mercury is passed into the tube and bulb until the tube is almost full. The bulb is heated above any temperature that the thermometer will be required to measure. The end of the bulb is then closed in where the mercury reaches.	By this means the mercury has room to rise and fall, so as to register different temperatures. There will, of course, be a space above the mercury column at any temperature below the highest the thermometer will register. [Teacher to help children to reason that, as there is no air in this space, there must be only vapour of mercury.]
Fill a small basin with pounded ice. Place a thermometer in the midst of it. After a short interval withdraw the thermometer, and let the girls note the level of the mercury in the tube.	The mercury has sunk or contracted until the level stands at a point marked 32° on the school thermometer.
Place the thermometer in boiling water, and when the mercury is steady note again the height of the mercury.	The mercury has expanded with the heat, and stands practically at the mark 212°.
Call attention to the scale of degrees on the thermometer, and how the scale is arranged.	Marks are placed at every one or two degrees. All the spaces are equal, showing that as mercury is heated it expands regularly.
	The scale thus enables us to tell the temperature registered by the thermometer, and the thermometer gives the temperature of any object with which it is placed in contact.

Alcohol Thermometer.—The alcohol thermometer might be shown, and it could be observed that it is not used to measure temperatures above 173° F. The reason of this would be told, and also the fact that, on the other hand, it can be used for measuring lower temperatures than the mercurial thermometer, because the freezing-point of alcohol is so low.

Alcohol thermometers are much employed, because cheaper than those containing mercury. The colourless alcohol is stained with colouring matter, in order that it may be better seen.

THE INSPECTOR'S NOTEBOOK.

BY AN INSPECTOR OF SCHOOLS.

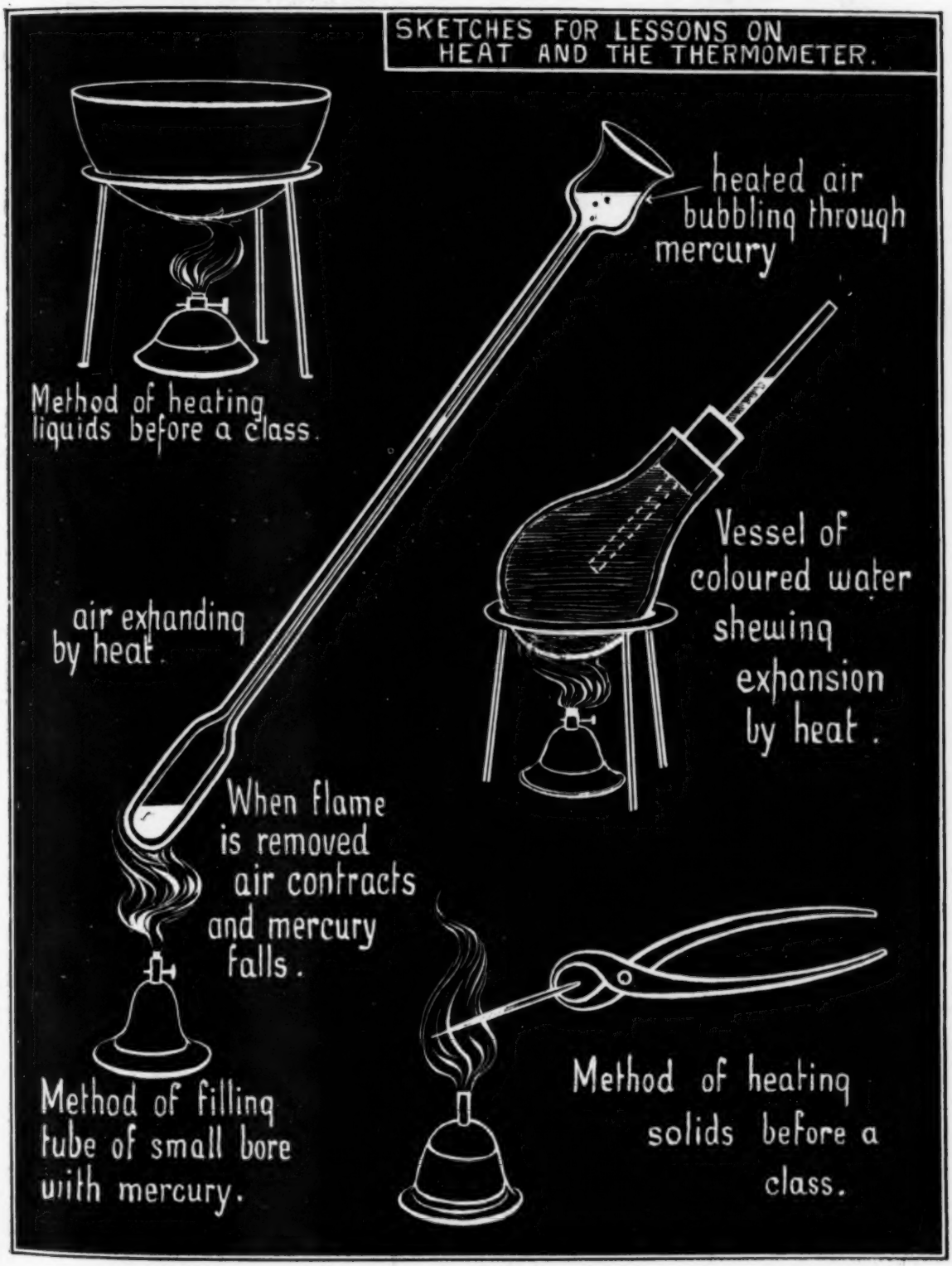
Form VIII. When the Forms IX., etc., come down to the managers, they are enclosed in a white form, known as Form VIII.; and as scarcely any teacher seems to know the contents of this document, I will refer to the more important. In many cases the Form VIII. never reaches the teacher. Of the eleven paragraphs the eighth and ninth are the most frequently ignored. They are as follows:—

"8. The syllabus of instruction required by Article 101 (*a*) (ii) of the Code for 1900 should be written out in full at the beginning of the school year, or of the educational year, where such year does not coincide with the school year. This syllabus must be in accordance with the provisions of Article 15 (*a*) and (*b*), and it must be kept at the school, in order that it may be produced to the inspector at his visits. A summary of the syllabus should also be drawn up and written in the log-book, and a copy of this summary should be sent by post to the inspector, for his approval before the beginning of the school year.

"9. At any visit to the school, whether paid with or without notice, the inspector may require to see the log-book, registers, portfolio, and punishment book; the pupil teachers' memoranda of agreement, and their text-books, note-books, and exercise books; the records of progress of the scholars,

BLACKBOARD ILLUSTRATION.

BY C. ARMSTRONG, ART MASTER AND SOUTH KENSINGTON EXAMINER; PRINCIPAL OF ARMSTRONG'S DRAWING SCHOOL.


SKETCHES FOR LESSONS ON HEAT AND THE THERMOMETER.
heated air bubbling through mercury
Method of heating liquids before a class.
Vessel of coloured water shewing expansion by heat.
air expanding by heat.
When flame is removed air contracts and mercury falls.
Method of filling tube of small bore with mercury.
Method of heating solids before a class.

as tested by periodical examinations; and, in schools not maintained by a School Board, the cash-book and vouchers. Any of these documents must also be forwarded to the inspector if he requires them."

Comments on Form VIII., §8, 9. With reference to the syllabuses, it will be noted that there should be—

1. The syllabus in detail.
2. A synopsis of this.

The synopsis must be written in the log-book, and approved by the inspector.

The sort of summary that will be considered satisfactory is one drawn up on the lines of the old schedules of instruction which appeared in all Codes up to this year. It should show at a glance, and in a concise manner, the whole curriculum of the school.

Syllabuses for Infant Schools. Some teachers seem to fancy that syllabuses are unnecessary for infant schools. That is a wrong idea. I give below a typical summary, something like what should appear in the log-book of an infant school:—

Reading.—Class I. Word-building from a good book on the "syllabic method of teaching reading;" reading of short sentences constructed from words taken from the above; reading from primers (to be named).

Class II. Word-building from a carefully-selected primer.

Babies. To know the sounds of the letters, and to easily recognise the letters.

Writing.—The youngest to write in sand; the middle class or classes to write on the blackboard; the eldest to write with slate and black-lead pencils.

Arithmetic.—The youngest to be taught numbers up to ten by means of objects; the middle class to thoroughly understand the composition of numbers up to and including ten; the eldest class to be taught the composition of numbers up to twenty. Very little slate work to be attempted.

Object Lessons, Nature-Study, Conversation Lessons.—The children to receive one lesson daily. The lessons will be suited to the time of the year, and will be taken from the detailed list as approved last year, with such additions and alterations as occasion may require, due note being kept of the same.

Kindergarten.—Some of this work to be done daily. The following occupations will be taken throughout the year:—

Class I. Clay-modelling, basket-weaving, and paper-folding.

Class II. Stick-laying, paper-folding, and mat-weaving.

Babies. Shell-laying; bead-threading; fraying; sorting of coloured wools.

Games.—At least ten to be taken during the year; particulars to be kept in the record books.

Music.—Voice training; modulator practice; hand signs; five songs.

Drill.—1. Marching; 2. the Maypole dance; 3. hoop drill; 4. Japanese fan drill. And so on with the other subjects.

Class-Teaching in Infant Schools. I find that too little attention is paid to the individual in infant schools. The remarks of Mr. Ward, H.M. Inspector (p. 103 of this year's Blue Book), are distinctly *à propos:* "There is so much 'class-teaching' that the unskilled teacher is apt to forget the need of training the individual. The result is that the class can answer accurately in arithmetic—that is, the brightest members of it; the class can read from the blackboard, and build words, but the individual often cannot. When the infants proceed to the upper schools they are tested individually, and they frequently fail in the test. The master votes the new-fangled methods a sham, and longs for the time to come again when each child was well drilled in the three R's, and ready in attainments and in mental attitude for the further drill of Standard I."

The "Notebook" Query Column.

Discipulus (Ceylon).—I am very glad my criticisms upon your last essay were useful to you. It is very pleasing to me to be able to assist such persevering students living in such a remote part of the empire. The essay on "Necessity" is written fairly well, and would obtain about 50 per cent. of the marks in one of the higher examinations. By a little cultivation of the style a much higher mark would be obtainable. Your friend is too wordy, and is often indefinite in his expressions. His sentences are occasionally Macaulay-like in their length. Nevertheless, he gives evidence of possessing a good store of knowledge, and of having fair aptitude for illustrating his points. I wish you both every success in your endeavour to get to an English university. I have met two or three Cingalese gentlemen in London.

I hope to hear from you again soon.

C.J.B.—Have you the Board of Education's Syllabus? If not, send for one at once, and read carefully the rules on page 14. Let me call your special attention to the first: "A candidate who in his first year's examination has been credited with marks for a *first class* in either stage of a subject may not obtain marks for the same stage of that subject in his second year's examination." From this it would appear that you are quite free to offer Physiography again. Of course you would have to sit again (*vide* direction, p. 13). "Marks for science are only allowed to candidates in the Certificate Examination for success obtained at the examination next preceding their Certificate Examination."

I am sorry my reply is so late.

T.H.D.—Consult the Directory of the Board of Education. You are not quite correctly informed. Examination of individuals for the issue of an elementary certificate is not actually abolished, but in future special application will be needed where persons desire an elementary certificate, and a fee will have to be paid.

You can, of course, take the advanced examination in Physiography. Consult also the Syllabus for Certificate Examination issued by the Board of Education. Read carefully pages 13 and 14, so far as they apply to acting teachers.

R.A.S.—You should certainly keep very carefully a record of the work done. It is not sufficient to be able to refer to the syllabus for the whole year. An inspector who visits in, say, the second quarter of the school year would require to be shown a written statement of the ground covered in the previous quarter, together with the portions proposed to be done in the present quarter or period.

Some teachers keep daily, others weekly, and others monthly records. Suit yourself; but whatever system you adopt, let it be complete in itself, and see that the syllabuses are not in a neglected condition.

Letters for this column should be addressed "Inspector," care of Editor, Practical Teacher.

THE "D" CERTIFICATE.

List of Text-Books Recommended.

We have been asked to compile a list of text-books suitable for the present "D" Certificate. The following, though not exhaustive, will be found sufficient:—

1. *Drawing with chalk, or brush with tempera, on the blackboard.*
   - "Blackboard Drawing"—Sparkes. (Cassell and Co.)
   - "Blackboard Drawing"—Steeley and Trotman. (Bacon and Co.)
2. *Model Drawing, Outline.*
   - "How to Draw from Models"—Sparkes. (Cassell and Co.)
   - "The Elements of Object Drawing"—A. F. Richards.
3. *Drawing in Light and Shade from a cast.*
   - "How to Shade from Models and Casts"—Sparkes. (Cassell and Co.)
   - "Light, Shade, and Shadow"—J. Speaking.
4. *Geometrical Drawing.*
   - "New Art Geometry." (Bacon and Co.)
   - "Geometry"—Carroll. (Burns and Oates.)
   - "Geometry"—Morris. (Longmans and Co.)
5. *Perspective.*
   - "Handbook of Perspective"—Hatton. (Chapman and Hall.)
   - "Perspective"—J. Petty. (Arnold, Leeds.)
   - "Perspective"—Carroll. (Bacon and Co.)

In addition to these there are the various articles in past numbers of the *Art Monthly*. Mr. Belsten's "Notes on Model Drawing" are most exhaustive; so were Mr. Seaby's papers on "Blackboard," and the "Light and Shade" in Vols. I. and II. For the new geometrical drawing, a new series of articles will appear in *The Practical Teacher's Art Monthly* (price 3d.).

The Practical Infant-School Teacher.

OUR MODEL INFANTS' SCHOOLS.

IV.—A NORTH LONDON BOARD SCHOOL.

Mulcaster and Infant Schools.

RICHARD MULCASTER, who died at the commencement of the seventeenth century, tells us in his *Positions*—the pedagogy of which is far ahead of the beginning of the twentieth century—that "the first grounds should be laid by the cunningest workman." Well, in some of our schools of infancy the cunningest workers are to be found; but they are women, and not men. It was our privilege, on a dull November afternoon, to visit a large London Board infant school, and we came away with the reflection that Richard Mulcaster would have rejoiced greatly could he but have witnessed the tithe of what we had the pleasure of seeing. "As cosen-germain to faire writing," said the same far-seeing Richard, "is the ability to draw with pen and pencil, and this should be taught while the finger is flexible." We can assure the shade of Richard that, so far as concerns this particular school, it is being taught; and the flexibility of the finger is asserting itself in a way undreamt of by Mulcaster, notwithstanding the rich endowment of the seventeenth-century sage in respect to Pisgah visions.

To the curious reader who would fain be told the name of the school and of the teacher thereof, we reply that wild horses should not draw these from us, for it was a condition of admission that the harmless necessary interviewer should promise not to disclose the name of the school, which had no desire whatever for publicity. Indeed, it was only in the hope that our article might assist other practical teachers in the conduct of their schools that we were allowed to be a chield amang them takin' notes for printing, to misquote Bobby Burns; and we hope that such will be the case, otherwise we shall not be able to look the courteous mistress in the face again.

The Babies.

We began, as was most fitting, with the babies, whom we found, to the number of about forty, in a commodious room, under the charge of a mistress who was evidently "born and not made" for infant management, so admirably did she do her spiriting.

The room was tastefully decorated with the work of the children's hands, but what distinguished it from ordinary babies' rooms was the presence of two things—namely, a large, zinc-lined, shallow box about 8 feet long and 4 feet broad, and of a depth of about a foot, and a blackboard running completely along one side of the room, at a convenient height for the children for whose use it was placed there. The shallow box was filled halfway up with sand, and the children amused themselves vastly by arranging tiny twigs of fir and other trees in such wise as to constitute a miniature forest. Each child was provided with a reduced facsimile, in which also was to be portrayed a still tinier forest. Calling some half-dozen little mites out of the class, the mistress set to work on freearm drawing on the aforesaid boards; and nothing could be more amusing and convincing than the workmanlike way in which the artists in embryo set about drawing a cat, and a creditable finish they made of it too.

The Two-Handed Man.

It would have warmed the heart of the late Mr. Charles, who wrote so longingly in *The Daily Telegraph*, some twenty years ago, a plea for the two-handed man. For here he was before our very eyes, working away with right and with left, just as though to the manner born; and here a frying-pan, there a leaf-spray, and many other objects that we need not mention, appeared as witnesses to the ambidexterity of the tiny artists of three. If ever children were set about the work of self-development by way of pleasurable activity, there they were before our eyes on this gloomy November afternoon. We followed the mistress into the various rooms, and saw that freearm drawing was one of the chief features of the school, and nothing was too difficult for the self-reliant little scholars to attempt to portray.

Mythology and Infants.

The mistress is deeply versed in the myths not only of ancient Greece and Rome, but, what is more to the purpose, also in those Scandinavian myths which so potently swayed the minds of the English sea-robbers who ousted the Britons and then impudently named them the strangers. Thor, the son of Odin and Freya, is no stranger to the little children of this North London Board school, for the god whose chariot wheels were said to cause thunder was under consideration at the time of our visit. He had been talked about, written about, read about, and the children were engaged in portraying the redoubtable war-god and his terrible chariot on his way to Thrudwanger, his palace of five hundred and forty pillars. Another myth that had occupied the minds of the children was that of Clytie, the daughter of the sea-king, who fell in love with the sun-god, and who, meeting with no return of her affection, was changed into a sunflower, which still turns to the sun, following him as he goes on his daily course. This tale of woe is also done in colours by the child artists of the Standard I. of this artistic school. Moreover, the reading lessons, all of which are printed by the teachers on brown paper, no other reading books being in use, have reference to the same subject.

Correlation.

It will be thus seen that the keynote of this school is correlation. This will also be evident from the scheme of object lessons which is reproduced, and which is in itself unique, being arranged—white on a black ground—in twelve sections of a circle, each of which stands for a month; moreover, the month's work, as set out in this sector, has a strict relation to the season of the year, and this relation permeates the whole of the work. For example, we visited the school in November. In one class we saw a striking representation of a dormouse asleep. The children had recently visited Epping Forest, and had been shown likely places wherein a dormouse might sleep his winter sleep. The children would draw the sleeping dormouse both as a freearm exercise and as a colour brush-work task. Before the class was one of the homely reading sheets to which reference has been made, and which we herewith reproduce:—

"'Snail, do you sleep when it is cold?'

"'Yes; I make my door and shut it. I go under a stone or under the leaves, and go to sleep.'

"'Frog, where do you sleep all the winter?'

"'I go to the pond and make a bed in the mud. I sleep till spring.'

"'Little fly, do you go to sleep too?'

"'Yes; and the spider sleeps all the cold days. We shall sleep till the sun calls us.'"

Another sheet had reference to the swallow, and a third to the squirrel, who seemed a prime favourite, perhaps because a goodly store of the nuts that he likes to put by for a rainy day had been brought out of one of the best-furnished working museums that we have ever seen in an infant school—and we have seen many—for use in the lesson, and not one of them had found its way back again into the cupboard. It would be impossible for us to give full details of the thought and ingenuity shown in thus selecting the work so as to make it accord with the actual facts of the life of the time being. We were greatly interested, and wholly convinced that it would be worth while striving to correlate not only in the infant school, but in all our schools. In this particular school, as before stated, the whole of the school programme had special reference to the season of the year. Song, recitation, reading, occupation, game, drawing, object lessons—all were related to each other by this natural bond. And let it not be thought that there was a resultant monotony. Nothing of the sort. The work was as varied as it possibly could be; and as for the knowledge displayed, and the way of obtaining it, these spelt development as plainly as could be. Miniature oaks and elms, etc., such as would have gladdened the hearts of Jap cultivators of pigmy trees, were there, and every phase in the growth thereof had been closely watched by the infant observers. Further, all sorts of seeds—and especially such as had special means of dispersing themselves—were not only under observation as seeds, but also in the various stages of metamorphosis from seed to plant.

"Spring is the morning of the year,
The Summer is the noontide bright,
The Autumn is the evening clear,
That comes before the Winter's night."
Summer—time of work.
"We only hear what we know."—GOETHE.
Spring—preparation for work.
"Every contact with Nature educates."—FROEBEL.
Winter—preparation for life.
"We can build our house but not ourselves."—HORSMAN.
Autumn—preparation for rest.
"We only see what we are trained to see."—CARLYLE.
JULY. Cherry. Bean. Sunflower.
JUNE. Summer Day. Frog, II. Duck. Bee.
MAY. Buttercup. Silkworm, II. Aquarium Frog, I.
MARCH. Spring Day. Primrose. Silkworm, I.
APRIL. Daffodil. Wallflower. Hyacinth.
FEBRUARY. Baby Day. Dandelion. Leaf-buds. Cocoon.
JANUARY. Snow. Snowdrop.
DECEMBER. Ivy. Holly. Christmas Pudding.
NOVEMBER. Robin. Sparrow. Forget Me. Coldish.
OCTOBER. Fruits and Leaves of Sycamore. Autumn Leaves. Walnut or Chestnut. Thistle-down.
SEPTEMBER. Barley. Hips and Haws. Oats. Blackberry. Apple.
AUGUST. Vacation.

CORRELATED WORK: OBJECT LESSONS (1900–1901).

Imagination.

We are all familiar with the essay as a test of, and as a stimulus to, the imaginative power; but writing, as a mode of expression, is insignificant when compared with drawing. This is not lost sight of in the school under notice, where it is customary to ask the children to draw, for example, such a house as they would like to live in; and it is interesting to note, as a "back to the land" trait, that these denizens of the land of brick and mortar never fail to provide their ideal abode with a wealth of tree and lawn, and even of lake.

Conclusion.

Judging from recent experience, we should not be surprised if a caustic critic were to say, What about the three R's? Well, we are not pretending to give a complete account of this truly excellent school. Our aim is mainly to draw attention to correlation and to expression by drawing, and especially by freearm drawing; but, lest it may be thought that the homely three have been slighted, we hasten to add that we saw convincing evidence to the contrary, and we give a facsimile of the essay of a six-year-old—taken at random from a host of others—with all its native faults and imperfections uncorrected, which we think will convince any intelligent critic that there is no need to be fearful on the score of the three that used to be the be-all and end-all of school teaching. The infant school mistress who has not yet adopted correlation, and who has doubts as to freearm drawing, should give them a fair trial, and we have no doubt that she will become as eloquent in praise thereof as are the mistresses of this admirable North London Board school, to whom the writer—an old stager of more years than he cares to count—takes off his hat by way of respectful and admiring adieu.

The Sun Fairy.

There was a sun-fairy who had a chariot and he had some rides on it then he went to the sea where the sea fairies was and told them wot he saw then they ast him if he would take them then they ast there father if they can go with him but there father siad no for if they did they would die then. then they saw him at the hills then they waved there hands at him and he took no notish of them and he went off and siad

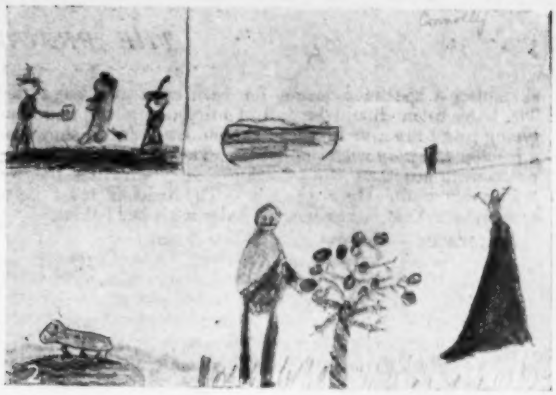
(For want of space, we have been unable to reproduce a *facsimile* of the child's penmanship, as we had hoped to do.)

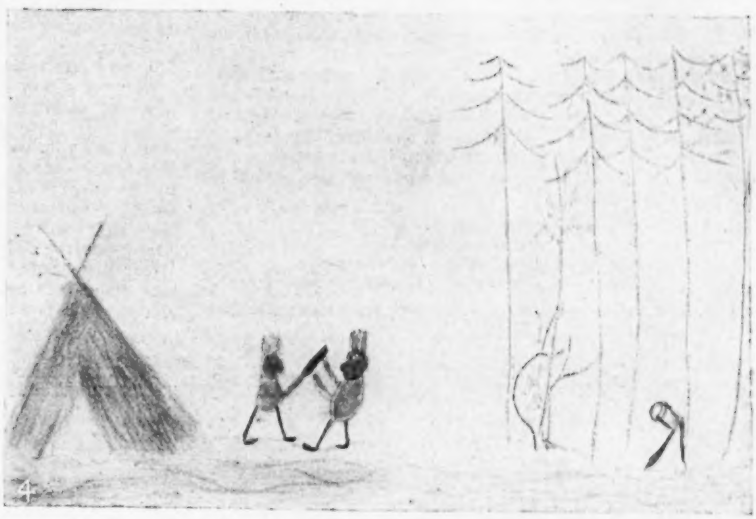
ELEMENTS OF READING.

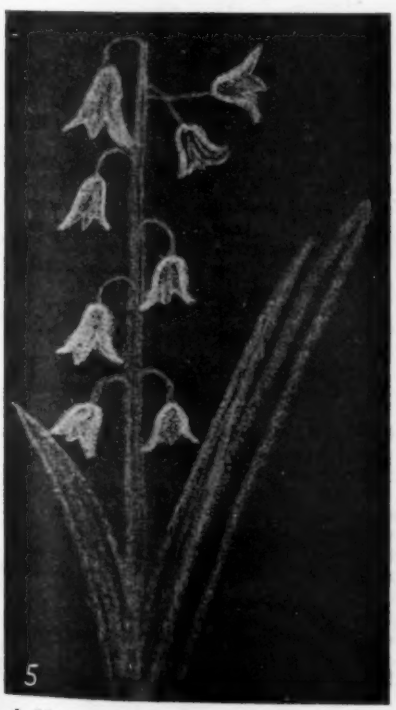
BY C. M. A. COOMBS, L.L.A.

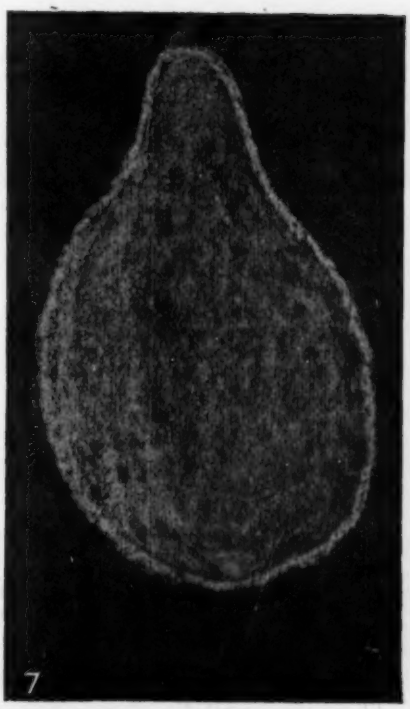
Introduction.—Should "babies" learn reading? This is a question which every year confronts the "baby" (three to four years) teacher. I answer, "Yes, certainly." For I know from experience that great enjoyment, as well as much good, can be derived from teaching the elements of reading in the baby room. I propose to vindicate my statement by

OUR MODEL INFANTS' SCHOOLS: DRAWINGS BY THE LITTLE ONES.









1. Maidens Dancing before Hercules by Riverside. 2. Hercules Interviews Old Man of the Sea; Atlas Plucking Apples whilst Hercules holds up Sky. 3. Cornflower. 4. Hiawatha Wrestling with Mondamin. 5. Hyacinth. 6. Buds. 7. Autumn Fruit.

sketching a specimen lesson for each apparatus suggested. The baby room should be full of mirth, laughter, and chattering; and my aim in these sketches will be to show how a teacher can *play* with the babies. There is perhaps nothing prettier to see than the affection and admiration the wee babies show for their teacher. The teacher must be so sympathetic that she becomes a baby with her babies.

Apparatus.—Monday.....Slats (wood).
Tuesday.....String.
Wednesday.....Sand.
Thursday.....Coloured strips.
Friday.....Giant letters.

No. I. Slats.—*Apparatus.*—These wee mites of children need to be doing something all the time, therefore always provide them with some good apparatus. The slats are thin bits of wood about seven inches long, and are extremely useful for the straight letters I, T, L, H, F, E, K, M, N, V, W, X. They should be arranged in bundles of four, secured with small elastic band.

Introduction.—Allow free talk between teacher and children about the letters made formerly, while the bundles are placed on ends of desks. The bundles are then passed and "put to bed"—made to lie down—at the top of the desks.

Lesson.—The children, all attention, imitate teacher, and say, as they lift their bundles, take out one slat, and hold it up straight in the air,—

"This is my bundle, you can see;
In my *left* hand it now must be.
Here is my *right:* come out, little man,
And tell us your name; I'm sure you can."

I is thus introduced. One child tell its name; another point it out on card of letters. It has a long tongue, and when it talks to us it says always, "Eye! eye!"

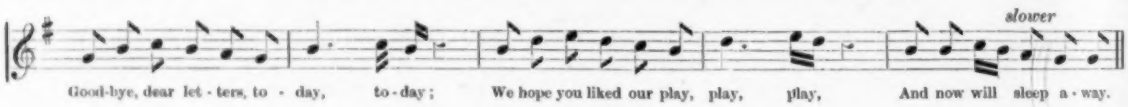
I wants to go for a walk, so he must have his hat on. (Pull out second slat, and place it in lying-down position on I's head.) T talks very quickly, and says (sound *t* as in *table*), "Jack, come and make T on blackboard. Grace, come and make a better hat. Who can find it first on my card?"

We said I wanted to go out; then let us give him a foot to walk with. Take away hat, and place it in lying-down position on edge of desk at bottom of letter I, pointing foot to pictures (right hand). This is letter L. (For sound, press tongue against roof of mouth and teeth.)

L wants to walk with this big foot, so open the garden gate. Where is it? Why, we must make it! Take up foot; make it stand up straight by side of letter I, and thus make two l's. Take up bundle; pull out No. 3; put bundle back to bed. Place No. 3 across middle, thus (teacher places hers on her sloping table), H. What name shall we give our garden gate? "Jim, come and point it out on my card. Flo, come and make it on blackboard."

Now for a new letter. Take away letter I on right-hand side, and make it stick out like a long arm from the top of letter I. Now, how many arms can you see? Yes; and shall I tell you his name? Let us whisper it: it is letter F. Who knows something that can swim in the water? Yes; and we say, "F is for Fish." Children repeat it three times. Look! Teacher bites her bottom lip a wee bit. You do it. Now say "fish." Teacher sounds only the *f* as in *fish*. Allow children to imitate her.

Our little slats are tired with all their work, so we will tuck them into bed. Children can put slats in band very easily. Pass bundles while singing,—



AT OUR INFANTS' DEPARTMENTS.

H.M. INSPECTOR'S VISIT.

Number of children on books, 365.
Number present, 307.
Staff: Head-mistress, two certificated assistants, five ex-pupil teachers, two probationers (both of whom were at the Pupil Teachers' Centre).

One afternoon in the beginning of June, the tenth month of the school year, H.M. Inspector entered school about 1.55. The children were assembling in the yard. He first obtained particulars from the mistress with regard to the staff and classes; numbers on the books, etc. Children were by this time engaged in their usual tasks. The inspector went to Class I., and heard them say "The Disobedient Rabbit." He questioned on the meaning of various words and phrases.

He next asked for Standard I. children. The teachers of both divisions were taking lessons on tables. Inspector approved the method used, which was as follows:—Children were learning that 6 × 7 make 42, and that 7 × 6 make 42. Teacher illustrated by blackboard and ball-frame thus:—

	6
7	6
7	6
7	6
7	6
7	6
7	6
42	42

When counting, children said 6 + 6 are 12, 12 + 6 are 18, etc. Inspector suggested that they should say 6, 12, 18, 24, 36, 42 only. He let them try this way. Teacher then showed the shorter way of writing down the result: 6 × 7 = 42, 7 × 6 = 42.

The inspector went back into the large room, and saw the writing of Class I. He said that it was very good, and suggested that paper should be used in the future.

Classes III. and IV. were taking needlework and drawing. H.M. Inspector looked at the drawing, and said he should like slates used, the upper half of which only was in squares.

He returned to Standard I. room, and heard several children read from Science Readers. He noticed that children were allowed to point. He said, as they could read so fluently, there was no necessity for pointing. Teacher remarked that the class was large, and by this means she could tell more readily if all were following the lesson.

The inspector then visited the babies' room, heard a little word building, and saw the drawing.

Children were now allowed to take their usual recreation.

When the children had regained their places, the inspector listened to the singing of the fives and sixes. Modulator exercises were taken, and one song was sung. The song chosen was a "lullaby" taken from *The Teacher's Aid.* He said he was glad to hear them sing so softly and sweetly. He recommended voice exercises.

Inspector next went to the babies' room, and heard the singing and recitation. He was pleased to see the babies enjoyed the singing.

In Standard I. room recitation was being taken. The piece he heard was "My Shadow." Questions were asked about shadows.

In the lower division of Standard I. reading was the next lesson. The inspector heard a few children read, and remarked on the progress made.

The babies were again visited; they were taking bead-threading. Inspector inquired what teacher taught by this occupation, and was told counting and colour.

He looked at the paper-folding of Class II., and the mat-weaving (combination mats) in Class I.; heard a few children read in Class III.

At ten minutes to four o'clock the inspector wished the teachers a pleasant "Good afternoon." Before leaving, he told the mistress that good progress was being made.

Five weeks later, on a very hot afternoon in July, the

second visit was paid, by another inspector. He entered school shortly after two o'clock; the classes were at work according to the time-table. As the work being taken was similar to that seen at the previous visit, lessons were changed.

Class I. was told to take needlework and drawing; Class II., reading; Classes III. and IV., object lessons. Class II. comprised the lower sixes. Inspector spoke favourably of their reading.

After the teachers had questioned on the object lessons, inspector asked them to question on something not previously talked about. The subjects taken were inspector's hat, waste-paper basket, and a box. Inspector said the drawing of Class I. boys was very good, but it should have been on paper. Teacher had carried out the suggestion made by the previous inspector, and had taken writing on paper, and was well pleased with the progress made. Some of this was shown the inspector, and he thought it good.

Children in the schoolroom were then allowed to go out to play.

Standard I. boys had drawn a curved line copy from Rooper's *Drawing Book*, Part II. This, the inspector said, was very well done, but he should have liked it on paper.

He next heard the teacher give an object lesson. One of the certificated assistants had left since the first visit, so for this lesson the ex-pupil teacher in charge had over ninety children. Inspector remarked he did not like long introductions; teacher should get on with the lesson at once.

In the babies' room drawing was again looked at, and the children had a conversational lesson on "The Duck."

Class IV. was asked to do some writing. When taking pencil drill, teacher used the left hand where children used the right, and *vice versâ*. The inspector objected to this, saying she should go to one side of the class, look over her shoulder, and use the same hand as the children, then go to the opposite side, and show how to use the other hand.

Number was taken with Classes I. and II., and varied occupation with Standard I.—paper-folding and designing.

Inspector saw the children's books, and expressed his approval. He said he should like them to take an additional occupation.

He then visited the babies, who were enjoying their games. Nursery rhymes with actions were being taken. Inspector remarked to the mistress that the babies' teacher was in her right place.

The afternoon's work was concluded with drill, after which the inspector left. All felt that his visit had been a very pleasant one.

INFANTS' DEPARTMENT TIME-TABLE.

MORNING.

	9 to 9.25	9.25 to 9.40	9.40 to 10.5.	10.5 to 10.30.	10.30 to 10.45	10.45 to 11.10.	11.10 to 11.25	11.25 to 11.50.	11.50 to 12.
I.	OPENING SCHOOL.	REGISTRATION. TEXTS AND HYMNS.	Arithmetic.	Object Lesson.	RECREATION.	Writing.	SINGING.	Reading.	DISMISSAL.
II.			Object Lesson.	Arithmetic.		Reading.		Writing.	
III.			Arithmetic.	Word Building.		"		"	
IV.			Word Building.	Arithmetic.		Writing.		Reading.	
V.			Writing.	Reading.		Arithmetic.		Object Lesson.	
VI.			"	"		"		"	
VII.			Reading.	Writing.		Object Lesson.		Arithmetic.	
I.			Word Building.	Arithmetic.		Reading.	DRILL.	Writing.	
II.			Arithmetic.	Word Building.		Writing.		Reading.	
III.			Writing.	Arithmetic.		Reading.		Object Lesson.	
IV.			Arithmetic.	Reading.		Writing.		"	
V.			Word Building.	Writing.		Arithmetic.		Drawing.	
VI.			"	"		"		"	
VII.			Arithmetic.	Word Building.		Drawing.		Object Lesson.	
I.			Mental Arith.	Reading.		Object Lesson.	DRILL.	Writing.	
II.			Object Lesson.	Writing.		Mental Arith.		Reading.	
III.			Arithmetic.	Word Building.		Writing.		"	
IV.			Word Building.	Arithmetic.		Reading.		Writing.	
V.			Writing.	"		Word Building.		Object Lesson.	
VI.			"	"		Reading.		"	
VII.			Reading.	Writing.		Object Lesson.		Arithmetic.	
I.			Word Building.	Arithmetic.		Reading.	SINGING.	Writing.	
II.			"	Reading.		Writing.		Arithmetic.	
III.			Writing.	Arithmetic.		Reading.		Object Lesson.	
IV.			Arithmetic.	Writing.		Object Lesson.		Reading.	
V.			Word Building.	Arithmetic.		Writing.		"	
VI.			"	Object Lesson.		Arithmetic.		Writing.	
VII.			Arithmetic.	Word Building.		Drawing.		Object Lesson.	
I.			Arithmetic.	Reading.		Object Lesson.	DRILL.	Writing.	
II.			Object Lesson.	Writing.		Arithmetic.		Reading.	
III.			"	Arithmetic.		Reading.		Writing.	
IV.			"	"		Writing.		Reading.	
V.			Arithmetic.	Writing.		Reading.		Object Lesson.	
VI.			"	Reading.		Writing.		"	
VII.			Reading.	Arithmetic.		Object Lesson.		Drawing.	

AFTERNOON.

	2 to 2.25.	2.25 to 2.50.	2.50 to 3.	3 to 3.30.	3.30 to 3.55.	3.55 to 4.
I.	Needlework and Drawing.	Drawing and Needlework.	RECREATION.	Spellings.	Arithmetic.	PRAYERS AND DISMISSAL.
II.	Needlework and Drawing.	Drawing and Needlework.		"	Reading.	
III.	Word Building.	Recitation.		Arithmetic.	"	
IV.	"	"		"	Writing.	
V.	"	"		Writing.	Varied Occ.	
VI.				Varied Occ.	Games.	
VII.				"	"	
I.	Tables.	Reading.		Recitation.	Varied Occ.	
II.	"	Varied Occ.		"	Reading.	
III.	Recitation.	Writing.		Singing.	Varied Occ.	
IV.	Writing.	Recitation.		"	"	
V.	Needlework and Drawing.			"	Reading.	
VI.	"	"		"	"	
VII.	Needlework.	Drawing.		"	Varied Occ.	
I.	Needlework and Drawing.			Arithmetic.	Conversational	
II.	"	"		Reading.	"	
III.	"	"		Arithmetic.	Reading.	
IV.	"	"		Reading.	Arithmetic.	
V.	Word Building.	Recitation.		Arithmetic.	Varied Occ.	
VI.	"	"		Varied Occ.	Story Lesson.	
VII.	"	"		"	"	
I.	Tables.	Reading.		Recitation.	Composition.	
II.	"	Composition.		"	Reading.	
III.	Writing.	Recitation.		Conver. Less.	"	
IV.	Recitation.	Writing.		Reading.	Conver. Less.	
V.	Needlework and Drawing.			Conver. Less.	Reading.	
VI.	"	"		Varied Occ.	Games.	
VII.	Word Building.	Needle. Drills.		"	"	
I.	Needlework and Drawing.			Singing.	Varied Occ.	
II.	"	"		"	"	
III.	"	"		"	"	
IV.	"	"		"	"	
V.	"	"		"	"	
VI.	"	"		"	"	
VII.	Word Building.	Arithmetic.		"	"	

A New Abacus. Invented by Mr. William A. Hodgson. The abacus before us, of which Mr. Hodgson has submitted a small model, and which he himself uses in the Board school under his care, consists of a box 27 inches long, 16 inches high, and 9 inches deep. The front of the apparatus is provided with three curtains of exactly the same width. These curtains are originally drawn down, thus hiding all the beads. Behind the curtain, to the right, there are nine horizontal wires, each containing one bead. To show, say, three units, we raise the curtain gradually till three beads, one over the other, are exposed to view. The child having been told that the beads behind the left-hand and middle curtains are respectively called hundreds and tens, he is expected to read the number thus: No hundreds, no tens, and three ones; and this is written on the blackboard, which increases the height of the front of the apparatus by a few extra inches, 003.

When the middle curtain is drawn up a portion of the way, the child sees a certain number—say four—of horizontal wires, with ten beads strung on each; and if, lastly, the left-hand curtain is drawn up a portion of the way, the child sees a certain number—say six—of drawers, each containing ten horizontal wires, and each wire containing ten beads; and he is expected to read the number thus: Six hundreds, four tens, and three ones, which, of course, soon becomes six hundred and forty-three, which is written on the blackboard in the ordinary way by means of figures. The child is thus able to read any number if the teacher raise the curtains, or is able to raise the curtains himself, so as actually to show the number of beads—up to 999—written on the board.

Mr. Hodgson claims for his abacus that it makes the operation of borrowing in subtraction perfectly intelligible to very little children.

The apparatus can be seen at Messrs. O. Newman and Co.'s Showrooms, 84 Newman Street, Oxford Street, W.

A SONG FOR THE INFANTS' SCHOOL: THE BIRDIE'S NEST.

KEY F.

{:s, | d :- :d | d :- :r | m :- :m | m :- :f | s :- :- | l :- :- | r :- :- | :
A lit - tle bird - ie from the West Flew o'er the sea,
{:r | m :- :m | m :- :m | f :- :f | f :- :l | s :- :- | t, :- :- | d :- :- | :
And laid with - in her co - sy nest Eggs one, two, three.

1 A LITTLE birdie from the West
Flew o'er the sea,
And laid within her cosy nest
Eggs one, two, three.

2 And soon her little birdies three
Broke through the shell;
The mother's heart was full of glee—
She loved them well.

3 She kept them cosy all day long
Beneath her wing,
And sang to them a bonnie song,
The dear wee thing.

4 Till all her brood so hungry grew,
And oped each mouth;
Then off for food the mother flew,
Both north and south.

5 They grew so big, and looked so spry,
In feathers drest,
And through the summer learned to fly
Far from their nest.

6 They flew away, as drew anear
The autumn fall;
But I am sure they'll come next year
To see us all.

This is a sweet and simple little song, which proves very attractive with suitable actions. The whole tune should be played as Introduction, and there need be no break between the verses.

OUR TUTORIAL SECTION

OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE.

BY ARTHUR T. FLUX,

Principal of the Belvedere Pupil Teachers' Centre, First on Scholarship List; Author of "Scholarship School Management," "Building of the British Empire," etc.

SCHOLARSHIP EXAMINATION, 1902.
First Month—January.

ON commencing a new course for the Scholarship Examination, it may be necessary to point out what is the scope of this course. An attempt is made to help those pupil teachers especially who are without the advantages of centre teaching by giving them advice and assistance on all points of difficulty; by directing their reading; by dividing the work up into regular sections, so as to ensure systematic work; and by providing monthly test examinations, to test the accuracy and definiteness of the work done during the month. In the latter, the questions are selected from recent Government examinations. Additional collections of questions are given from time to time, together with such explanatory or additional notes as may be deemed necessary. The answers to the test questions are marked and returned for a nominal charge. More than this it is impossible for any Correspondence Course to do without the direct co-operation of the student, which may be given by sending any suggestion which would tend to make this course more helpful, and especially by writing for assistance in any difficulty. This is willingly given, either by letter or through the correspondence column. Any one who follows this course, and honestly does the work set, will have no need to fear the examination, as dozens of letters from successful candidates attest.

Method of Work.—There is no royal and easy road to success; it is inevitably the result of regular, hard, and intelligent work, continued throughout the year without intermission, without haste, and without overwork. A time table must be prepared, in which each subject receives a proper proportion of time, and this must be rigidly adhered to. No accumulation of work must be allowed; nothing should be permitted to interfere with the arrangements for study. Proper time must be allotted for recreation. It is useless to put down six or seven hours a day for study. This will either be violated or health will suffer. Three hours per diem should be sufficient for the average student to master the whole syllabus well. Whatever is learned, must be learned thoroughly. The greatest fault observable in specimen answers submitted to me is the haziness of ideas, especially in geography and history. The power to retain a fact depends very largely upon the definiteness and depth of the first impression. If that impression be slight and hazy, it will soon fade away; if it be clear and deep, it will last. Therefore *make* the impression a clear and deep one. The tale is told of a brilliant university scholar that he read as many pages as his comrades did books, and yet he invariably headed the lists. The reason is obvious: when he had finished a page he *knew* it, once and for all.

Note-books must be kept for each subject, not for the purpose of transcribing half a text-book, but for entering analyses, definitions, vocabularies, etc.—whatever, in fact, has to be committed to memory. These should always be at hand in the many spare minutes which occur in every life. It is only the lazy man who has no time to spare.

Finally, I will repeat what is said above. I want every student to understand clearly that he is invited to write to me direct over anything in his work which puzzles him. There is no need to apologise for so doing; any help possible will be willingly given.

The New Syllabus.

(*The syllabus for the examination may be obtained post free by applying to the Secretary, Board of Education, Whitehall, London, S.W.*)

There are a few changes this year which must be noted. The notice at the head of the syllabus, "Defective spelling or handwriting may be taken into account in estimating the value of a candidate's work," is a warning rendered necessary by the slovenly character of some of the papers submitted, and should be laid to heart by those whose writing is not up to the mark. There will be no separate paper on the theory of teaching, but candidates will be required to answer questions on the method of teaching any subjects in the various papers. Domestic economy is entirely omitted. There will be a paper on "General Information," on which more is said below.

The following is a summary of the syllabus, together with the text books recommended:—

1. *Reading.—To read with ease, intelligence, and clear enunciation from one of Scott's novels or from one of Macaulay's "Essays."*

As *Quentin Durward* is a book set for special preparation in English, this will naturally be the book selected. This is published in the beautiful New Century Library by Messrs. T. Nelson, at 2s. Notes are given in another column.

This subject requires considerable attention. Something more than mere repetition of words is needed, and all students should take regular *oral* practice before a competent critic.

2. *Repetition.—To repeat one hundred lines of Shakespeare, or some other standard English author, with clearness and force, and knowledge of meanings and allusions.*

This may well be chosen from the English author. In *Julius Cæsar*, the quarrel between Brutus and Cassius is very suitable.

3. *Teaching.—To teach a class in the presence of H.M. Inspector.*

Candidates should endeavour to teach intelligently, to acquire a good manner, and to get rid of the nervousness which oft-times spoils a good lesson. Text-book: *Scholarship School Management* (Nelson and Sons, 1s. 6d.).

4. *Drawing.—Freehand drawing in outline.*

Candidates are required to make a drawing in outline on a half imperial sheet of paper (15" by 22") from a photographic representation of a cast of ornament, or from a photograph of a simple spray of natural foliage, flowers, or fruit on a plain background. Messrs. Nelson publish *Photographic Representations of Casts*, price 2s. 6d., which afford good practice.

5. *Music.*—This is the same as last year. All students should endeavour to get the School Teacher's Certificate in Sol-fa during the year. The text-book is *School Music Teacher*, 3s. 6d. (Messrs. J. J. Curwen and Sons). For practical music, *Practical Music for Pupil Teachers*, 6d., by the same firm, is a very good book.

6. *Needlework.—One of the following exercises:—*

(*a*) A test in making or mending some part of a calico or flannel garment.

(*b*) A test in cutting out by proportion or by measurement one of the following: a chemise, an overall, and a good petticoat.

Messrs. Longmans publish an excellent text-book on this subject. The price is 6s., but the book is well worth it.

7. *Penmanship.—To set copies in large and small hand.*

This is universally a weak subject, and requires daily attention. All candidates are strongly advised to get the *Practical Teacher Copy-Book*, 1s. (Messrs. Nelson), a book specially prepared for their use, containing exact rules for the formation of letters, and abundant examples for practice.

8. *Writing from Dictation.*—Many students lose marks in this subject unnecessarily. Practice is, of course, needed, but so is preparation. A very useful little series of books is *A Thousand*

Words Commonly Misspelt, Series A, B, and C, 1d. each (Dawson's). If these are learned, it is hardly likely that any difficulty will present itself in the examination.

9. *English Composition.—To write a short essay upon a given subject.*

The best book for this is *The Art of Writing English*, by Prof. Meiklejohn, 2s. 6d. (A. M. Holden), and also his *Hundred Essays in Outline.*

10. *English Language and Literature.*—

(1.) *Parsing and analysis of sentences.*

(2.) *Elementary etymology and a general outline of the history of the English language.*

(3.) *For exact and detailed study, Shakespeare's "Julius Cæsar" or Milton's "Paradise Lost," Book III.*

(4.) *For general reading, Scott's "Quentin Durward," and R. L. Stevenson's "The Master of Ballantrae."*

(1) and (2) are covered by *The Pupil Teacher's English Notebook*, 8d. (Nelson). *Julius Cæsar:* Allman's or Moffatt and Paige's edition is recommended. For *Paradise Lost:* Messrs. Nelson's *Paradise Lost*, Book III., 1s., specially prepared for Pupil Teachers and Scholarship students.

Quentin Durward is one of the volumes of the New Century Library (Nelson's, 2s.); and Messrs. Cassell and Co. are issuing an annotated edition of *The Master of Ballantrae* (1s. 6d.).

11. *Geography.—Outlines of the physical and political geography of the world, with special reference to the British Isles, India, and the chief British colonies and dependencies.*

Any good text-book, such as Meiklejohn's, Brook's, Gill's, etc., will do for the general work. Messrs. Blackie publish an excellent little book on the British Isles at 1s. 6d. Gill's *Colonies*, at 2s. 6d., is also recommended. In addition to these, much useful information may be obtained from the handbooks given away by the agents of the various colonies.

For map drawing, which will be required to illustrate answers, the *Methodic Memory Maps*, 1s. (Messrs. Nelson), will be found useful. A good atlas is also a necessity.

12. *History.—Outlines of English history from the Roman invasion to 1870.*

Any good text-book (Gardiner's, Meiklejohn's, etc.) will do. Wills's *Synopsis* (Blackie, 1s. 6d.) is a useful summary, and Longmans' *Atlas of Historical Geography*, 5s., is extremely useful.

13. *Arithmetic.—Arithmetic, including the measurements of rectangular areas and solids.*

By far the best book is Christian and Collar's *New Arithmetic* (A. M. Holden, 4s. 6d.).

14. *Algebra.—As far as and including quadratic equations of one unknown quantity, with easy problems leading to any of these equations, together with simple questions on ratio and proportion.*

Text-book, Hall and Knight's (Macmillan and Co., 4s. 6d.).

15. *Euclid.—Books I. and II., with simple geometrical exercises.*

Any standard Euclid will do. Egan's *Exercises on Books I. and II.* is strongly recommended for deductions.

16. *Languages.—One of the following: Latin, French, Welsh, Greek, German, Hebrew, with grammar, unseen translation, and simple composition.*

In Latin the text-book is Nepos' *Lives of Miltiades and Epaminondas*, a specially prepared edition of which is issued by T. Nelson and Sons, and is strongly recommended.

There is no set book in French, and the candidate should read as much as possible from the many books issued with notes and vocabularies.

17. *Elementary Science.*—This is arranged in two sections.

Section I., as last year, is fully covered by Cartwright's "*Section One*" *Physiography* (Nelson).

Section II. is arranged in three parts—A, B, and C—one of which is to be taken. A is elementary chemistry; B, elementary astronomy; C, elementary biology.

18. *General information.—"A paper will be set to test the general knowledge of candidates."*

(A special article on this appears in another column, which the student is advised to read carefully.)

In addition to the books mentioned above, every student should have a good derivative dictionary always at hand.* Whitaker's *Almanac* is also most useful for reference. If any student is in doubt about the suitability of his books—and it must be remembered that good text-books are most important—he should write me enclosing a list of the books he has.

Work for the Month.

1. *Reading.—Quentin Durward*, chaps. i.–vi. (For notes, see page 368.)

2. *Repetition.*—Ten or twelve lines per week till the whole is known.

3. *Teaching.*—Chap. i., *Scholarship School Management.* This chapter deals with the elements of psychology, a knowledge of which must underlie all successful teaching. The student must therefore prepare this thoroughly, noting the various faculties, the order of their appearing, their development, etc. If this is not done, much of the class management must necessarily be to a very great extent working blindly.

4. *Drawing.*—A freehand copy per week should be drawn. Note the size of the drawing required. The greatest attention must be given to blocking out the space in proper proportion, and putting in the main guiding lines of the copy. The completion of the detail is largely a subordinate matter. The lining in should be in soft, smooth, flowing lines, and not in the hard, wiry lines so often seen. The whole exercise is the cultivation of *free* hand as opposed to stiff mechanical work. Copies will be criticised at any time.

5. *Music.*—Chap. i., *School Music Teacher.* The modulator, and pointing on the modulator; first steps, mental effects, etc.

6. *Needlework.*

7. *Penmanship.*—The capital letters (*Practical Teacher Copy-Book*). Note carefully the rules for height and length. Use good ink and a good pen. Students should always use the same pen. If in doubt as to what to select, get a sample box of Brandauer's pens and try them. A fairly fine point should be chosen. It must be remembered that a few minutes' daily practice will be of little use unless accompanied by continual care in *all* writing.

8. *Spelling.*—Learn 100 words per week from the little books recommended above.

9. *Composition.*—Write one or two essays weekly on such subjects as "Newspapers," "Books," "The Seasons," "Penny Wise, Pound Foolish," "Migration of Birds," "Good Manners." There are two parts of this exercise: first, the collection of the proper facts; and secondly, the arrangement of the facts in logical order, and their expression in correct and forcible English. Every subject dealt with during the year should be read up if necessary, and the facts arranged as a skeleton plan in a notebook kept exclusively for that purpose. This *mapping out* of an essay is of the highest importance; it prevents that style, wandering and full of repetitions, so often met with.

To improve composition you must read good books.

10. *English.*—

(1.) Twenty-five roots and meanings per week.

(2.) The grammar of the noun.

(3.) The language up to the Conquest. Note the Celtic, Danish, and Latin additions to Anglo-Saxon during this period. Learn something of Cædmon, the *Beowulf*, the *Saxon Chronicle*, Bede, Alfred.

(4.) *Julius Cæsar.*—Prepare Act I., Scene 1, and Scene 2 as far as line 180, "What hath proceeded worthy note to-day."

Parsing, analysis, paraphrase, meanings of allusions, meaning of difficult passages, derivations of important words, must all be attended to. Read the play first to acquire the general meaning, and endeavour by thought, etc., to appreciate its value. Do not regard it merely as an extended exercise in parsing and analysis, but as one of the finest plays of the greatest dramatist the world has seen. With a good text-book, such as the one recommended, there is no necessity to give full notes, but I shall be pleased to assist any student in any difficulty, if he will write.

11. *Geography.*—

(*a*) Revise the British Isles.

(*b*) The European and Asiatic possessions (excluding India).

Too much importance can hardly be attached to the drawing of maps as an aid to the preparation of this subject. Great attention should in all cases be given to productions, industries, imports and exports, means of communication, and government. In dealing with the smaller colonies, their importance to the Empire should be clearly understood, and some knowledge should be gained of the line of steam-ships which regularly visit them. Candidates should be prepared to answer such questions as:—How long does it take to get to Aden? By what line of steamers would you travel? What are its imports and exports? Of what use is it to the Empire? How is it governed? How did it come into our hands? etc.

Notes must be carefully made in this subject, so that when revision is commenced the notebook may take the place of the text-book. Whatever is entered in the notebook must be thoroughly known. In addition to the ordinary text-book, all

* Chambers's new *Twentieth Century Dictionary* (3s. 6d.) is far and away the best.—Ed.

books of travel or exploration dealing with the country should be read. The ordinary school readers are often useful, since they put the facts clearly and in an attractive manner. Remember always, "a little known well is better than much prepared imperfectly."

12. *History.*—From the Roman Invasion to the Norman Conquest, 1066.

The chief points which need attention are:—

(1.) The British: who they were, their habits, manners, arts, religion, etc.

(2.) Cæsar's invasions: why did he come? and what were the results?

(3.) The Roman Conquest: divisions of the country, mode of government, walls and roads.

(4.) Why did the Romans leave? Results of their occupation—(*a*) on the country; (*b*) on the people. (See note in the Certificate Course.)

(5.) The Anglo-Saxons: who were they? whence did they come? where did the various tribes settle? The Bretwaldas; the various kingdoms, and how they gradually became three, and ultimately one.

(6.) Anglo-Saxon system of land-tenure, manners, religion, institutions, etc.

(7.) The reign of Alfred: reforms in army, laws, education, the navy, etc.

(8.) Dunstan, the first of a long line of great churchmen; his attempts to reform the Anglo-Saxon Church.

(9.) The Danish invasions, and the objects. Compare and contrast them with the Roman and Saxon.

(10.) The way in which the events preceding the Conquest paved the way for that movement. Learn the dates thoroughly. Summarise into note-books. Prepare brief lives of all important men. Prepare also a map of Roman and of Saxon England.

13. *Arithmetic.*—This subject should be one of easy preparation, since the syllabus is not more advanced than that for second year pupil teachers. Extra attention should, however, be given to the theory of the rules. For this month, revise in Christian and Collar as far as the end of L.C.M. It will not be necessary to work all the examples, but they should be examined, and any sum presenting difficulty should be worked. There are several in G.C.M. and L.C.M. which will puzzle the average student.

14. *Algebra.*—In this subject, again, most of the work has already been done, but it will perhaps be well to revise thoroughly some of the earlier parts. All students are strongly advised to get Hall and Knight's *Algebra*, 4s. 6d., and for this month revise the excellent chapters on factors.

15. *Euclid.*—Book II., Props. 1–4, with four deductions per week.

16. *Languages.*—Latin or French. Number and gender of nouns, with as much reading as possible. Chaps. i.–iii. *Life of Miltiades* (PRACTICAL TEACHER edition).

I am often asked whether it is possible for a student to prepare the language in the year, having no previous knowledge. The answer is, that it depends upon the student's power of acquisition and the general state of his other work. If these are good, then the language paper should be taken; if not, it had better be left alone. The note appended in the syllabus to the effect that "Candidates who obtain less than 25 per cent. will not be credited with marks" points to the fact that many take this paper with very inadequate preparation. To spend forty or fifty hours on a language, and then gain no marks for it, is bad economy.

17. *Elementary Science.*—*Matter:* Forms of matter, indestructibility, mass volume, density, specific gravity, weight, centre of gravity.

Force, motion, and inertia: The parallelogram of forces, composition and resolution of forces, conversion of rectilinear into circular motion.

18. *General Information.*—The chief points with regard to this new subject are discussed on another page.

Next month a Test Paper will be set on the work prescribed above.

SPRING EXAMINATION, 1902.

Tenth Month—January.

WORK TO BE PREPARED.

1. ENGLISH.

Candidates.—Gray's *Ode on the Spring*, verses 3 and 4. Analyse the whole, and parse all words presenting any difficulty.

First Year.—The *Expostulation*, lines 280–309, or *The Task*, Book V., lines 292–330. The derivation of all important words must be learned, and the notes in the text-book thoroughly prepared.

Second Year.—*Paradise Lost*, Book III., lines 572–630.

2. COMPOSITION.

Write one or two essays each week from the list in the *Pupil Teacher's English Notebook*, and send one up occasionally for criticism.

3. HISTORY.

Candidates.—George III. and George IV.
First Year.—Edward and Mary.
Second Year.—George IV. and William IV.

4. GEOGRAPHY.

Candidates.—The general geography of Asia and Australia.
First Year.—China and Japan.
Second Year.—New Zealand.

5. ARITHMETIC.

All Years.—General problems on the year's work.

6. EUCLID AND ALGEBRA.

First Year.—Euclid: Revise Props. 5–12, with six deductions per week. Algebra: general exercises.

Second Year.—Euclid: Props. 30–40, with six deductions per week. Algebra: problems leading to equations and general exercises.

Notes on the Work for the Month.

1. ENGLISH.

Candidates.—GRAY'S "ODE ON THE SPRING."

General Paraphrase (continued).

Verse 3. At the hour of noon the labourers are enjoying a short rest from their toil, and the flocks and herds seek the shadow of some tree to protect them from the heat. Yet the air is full of the sound produced by the busy insects. The genial weather has brought them forth in myriads to feast on the honey of the fully-opened flowers, or to flit joyously through the warm air. Some skim lightly over the face of the still waters; others, darting to and fro in the sunlight, exhibit a wealth and beauty of colour.

Verse 4. To the contemplative philosopher there is a great similarity between the life of these insects and that of mankind. There are great diversities in each kind. Some insects are slow of movement, others move with a rapidity which the eye cannot follow; some are decked in gorgeous colours, and others in the soberest of hues. So with men. Some lead a quiet, uneventful life, others have a brilliant career; some are endowed with all the charms of wealth and beauty, and others possess no quality which specially distinguishes them from their fellows. Yet insect and man alike are subject to the sudden changes of fortune. An accident may occur to them when least expected; but whether it does or not, their life passes rapidly away, old age creeps on apace, and soon they will return to the dust from which they sprung, and all the fitful fever of this life passes into an endless rest.

Notes on Parsing, Analysis, etc.

Verse 3. *Still.* Adjective, qualifying *hand* predicatively.
Care. An example of the personification so often used by Gray.
Herd. Collective noun, neuter gender.
Yet. Conjunction, adversative.
Hark is hardly an interjection, but rather a verb in the imperative mood. If taken as such, the following sentence is a noun sentence governed by it.
Youth. Collective noun, plural number.
To taste. Infinitive, limiting *eager.*
Float. Infinitive, limiting *eager.*
Some. Pronoun, indefinite.

Verse 4. *Contemplation.* Another example of personification.
Such. Demonstrative adjective.
Alike. Adverb of manner, modifying *flutter.*
But. Adverb of degree, modifying *flutter.*
Drest. Perfect participle, qualifying *busy* and *gay.*
Brushed, chilled. Perfect participles, qualifying *they.*
To rest. Infinitive of purpose to *lease.*

First Year.—COWPER'S "TASK," BOOK V.

General Paraphrase (continued).

Line 293. But the strangest of all the aspects of the question is that neither the result of their own sad experience nor the examples set by men who, by their bravery, have obtained their freedom, can even now, when they have mastered the mysteries of science, and attained a familiar knowledge of philosophic truths, induce mankind in general to set themselves free from such intolerable oppression.

Men are such slaves to habit, and so ready to revere and uphold what is in itself wrong, provided only it is of long standing and can plead precedent for its use, that even the degrading servitude in which they live is respected and honoured as a precious possession, because it is inherited from their ancestors.

But is it right? Will it bear the attack of reasonable discussion and thought, that any man of the same flesh and blood as all others, with the same passions and emotions, with the same tendencies to folly and sin as may always be found in his subjects, should be elevated to a position of absolute power over them, and make them his slaves, while he alone remains free?

Line 313. Should he have the power to declare war against any other people, at any time, when there is no justification for such an action; and then, to pay for the cost of it, wring from his subjects the money which they can ill spare,

by any means which his fancy may recommend, and, by forcing them to fight his battles, cause their death—although, owing to the miserable state in which they live, death may be a happy release?

The subjects who submit to this are worse than the trees in Jotham's parable, who assembled to choose a king, and made the bramble their ruler. In what way can they possibly acquire the necessary patience and fortitude to submit to such acts of tyranny? Yet not only do they tolerate it, but they seem to be pleased at the ill-treatment they receive, and load the creator of all their suffering with the most servile adulation and flattery.

Notes on Parsing, Analysis, etc.

Line 293. Supply *it is*.
Neither. Conjunction correlative with *nor*.
294. *Set*. Perfect participle, qualifying *examples*.
296. *Can*. Principal, defective verb.
Even. Adverb of emphasis, modifying *now*.
Mature. Adjective, qualifying *they*, used proleptically after *are grown*.
298. *Familiar*. Adjective, qualifying *they*, used proleptically after *are grown*.
To emancipate. Infinitive, governed by *serve*.
299. *So*. Adverb of degree, limiting *prone*.
300. *To reverence*. Infinitive, limiting *prone*.
What . . . ancient. Noun sentence, governed by *to reverence*.
Supply *what* before *can*.
302. *That even servitude*, etc. Adverbial sentence of degree, limiting *so prone*.
Even. Adjective of emphasis, limiting *servitude*.
Worst. Adjective, superlative degree.
303. *Because*. Conjunction joining participle *delivered* to *servitude*.
Delivered. Perfect participle, qualifying *servitude*. In analysis take it and dependent words as an enlargement of *servitude*. There is no need to make a separate sentence.
306. *That a man*, etc. Noun sentence in apposition with *it* (305).
307. This line is an enlargement of *man*.
Made. Past participle, qualifying *man*.—*Up*. Adverb, limiting *made*.
Like. Adverb, modifying *made* and governing *men*.
309. *As*. Adverb of degree, limiting *ample*.
In whom as in the bowens of the slaves. Extension of *meet*.
311. *Should be*. Subjunctive mood.
312. *Himself*. Reflexive pronoun. Note the double object.
314. *With any . . . sustained*. Extension of *wage*.
318. *That thus*, etc. Adverbial sentence of reason.
319. *Thousands*. Indirect object, governed by *may procure*.
320. *Opportunity*. Direct object, governed by *may procure*.
To die. Infinitive, limiting the noun *opportunity*—a not uncommon use of the infinitive (compare, bread to eat; water to drink).
321. *Of old*. Should be taken together as an adverb of time.
324. *Reclined*. Perfect participle, qualifying *who*; not a predicate.
327. *Where* and *whence*. Interrogative adverbs.
328. *It*. Impersonal pronoun.
329, 330. These lines are in apposition with *it*.

Full notes on the *Expostulation* will be found in the edition recommended—that by Messrs. T. Nelson and Sons.

Second Year.

For notes, paraphrases, etc., see *Paradise Lost*, Book III. (Messrs. T. Nelson and Sons).

2. History.

Candidates.—See notes in history for last month.

First Year.—The reign of Edward was very favourable to the Protestant religion, since the Protestant nobility modified the will of the late king to suit their own views. The chief points in which the Reformed Church differed from the old religion were:—

1. English took the place of Latin in the church services.
2. The images of saints were removed from the churches, and much of the beautiful carving and decoration was irretrievably ruined.
3. Auricular confession no longer essential.
4. Masses for the dead considered to be useless.
5. The sacrament was administered in both kinds—both bread and wine; the old church gave the bread only.
6. Celibacy of the clergy not insisted upon.
7. The Reformed Church rejected the doctrine of Transubstantiation, which was a belief that the substances of the elements were changed after consecration into the actual body and blood of Christ. Luther supposed that the substances were so united that they might be called either bread and wine, or the body and blood. The Calvinists regarded sacrament as a mere commemoration, and denied all presence. Bucer thought it was present by faith, in reality, but not in substance.

The events of the reign fall under two heads:—

1. *Protectorate of Somerset* (1547-49).
The Protestant religion established. Prayer Book published. Act of Uniformity passed. The Vagrant Act, to check the increasing restlessness of the poor. Ket's rebellion in Norfolk.
2. *Protectorate of Warwick* (1549-53).
Execution of Somerset. Second Prayer Book published, and forty-two articles issued. Death of the King.

Mary.
1. Suppression of Northumberland's plan for seating Lady Jane Grey on the throne.
2. Restoration of the Roman Catholic religion. Proposed marriage with Philip.
3. Wyatt's rebellion. Execution of Lady Jane and her husband.
4. The Marian persecution.
5. The war with France, and loss of Calais.

Second Year.—Chief points.

George IV.
The Cato Street conspiracy.
Reform of the criminal law—a most important measure.
Reciprocity of Duties Bill, repealing the old Navigation Act—a step towards free trade.
Commercial panic.
Catholic Emancipation Bill.
Battle of Navarino, which led directly to the independence of Greece.

William IV.
The Reform Bill—perhaps the most important measure of the century. This must be thoroughly prepared.
The abolition of slavery—£20,000,000 paid as compensation.
The Factory Act—protecting women and children.
Poor Law Amendment—another important measure.
The Municipal Corporation Act, regulating the methods of government of borough towns.
Note also the opening of the first railway.

3. Geography.

Candidates.—The same method must be followed as explained before. Draw a large map, insert all details to be remembered, and repeat till thoroughly known.

First Year.—China and Japan. The geography of these two countries needs special attention in view of recent affairs, and also because of the points of contrast between them. The solid conservatism of the Celestial Empire is rendered more apparent by the rapidity with which the neighbouring empire has absorbed Western ideas.

China possesses—including dependencies—an area of four and a half million square miles, and a population of over three hundred millions, and is on the whole an agricultural country. The chief exports are tea, silk, skins and furs, straw, and bristles; the chief imports are opium, cotton and woollen stuffs, kerosene, ginseng, and rice. Considering its size and population, its foreign trade is very small—due first to the all-sufficiency of the country to supply the needs of the inhabitants, and secondly, to the antipathy to foreigners. There is an army of nominally a million and a quarter, but only a few thousands can be called disciplined troops. The Chinese are a highly educated people—on their own lines. (This applies to the men, for women in China occupy a very subordinate position.)

The recent troubles in China originated in the hatred of the natives for the "foreign devils," as they call all Europeans, and was probably fomented by the Empress-Dowager for political purposes. The Celestial exclusiveness has been partially broken down by the forcible opening of thirty-one Treaty Ports. England has secured Hong-Kong and Kowloon in the south, and Wei-hai-wei in the north; Russia has Port Arthur; and all European nations are anxious for "concessions."

Japan has during one generation advanced from the position of an unknown country to that of one of the most important nations of the world.

Since the forcible opening of the ports in 1854, and still more so since the revolution of 1868, when the Mikado assumed the power previously wielded by ministers, the advance has been unparalleled. The Emperor, in 1889, granted a constitution very similar to ours, and the first Parliament met in 1890. There are now between four and five thousand miles of railway, telegraph lines, postal arrangements, newspapers, technical colleges, an army of three hundred thousand men, well armed and trained, a powerful navy which smashed up the Chinese navy in a few hours, arsenal, factories, manufactures, and all the usual concomitants of a civilised state.

Second Year.—New Zealand. Copy the following notes into notebook, and learn.

Area.—North Island, 44,468 square miles; South Island, 58,525; Stewart Island, 665.

Population.—720,000 Europeans, and 37,000 natives (Maoris).

Climate.—Very temperate. Similar to England, but slightly warmer.

Exports.—Wool, frozen meet, butter, cheese, gold, flax, tallow, kauri gum, timber.

Imports.—Apparel, cotton goods, leather, iron and steel goods, machinery, spirits, woollens.

Stock.—20 million sheep, 1¼ million cattle, 300,000 horses.

Government.
1. Governor. Earl of Ranfurly.
2. Legislative Council of forty-five members appointed by the Governor for seven years.
3. House of Representatives of seventy-four members elected for three years. Four of these members are Maoris.

Education.—Free, secular, and compulsory.

Chief Towns.—Wellington, Auckland, Dunedin, Christchurch, Invercargill, Napier, Nelson, Oamaru.

Learn a memory map.

Questions on the Month's Work.

Candidates.

1. Analyse the following, and parse the words in italics:—

"*Beside some* water's rushy brink,
With me the Muse *shall* sit and *think*
(At ease *reclined* in rustic state)
How vain the *ardour* of the *crowd*."

2. Gray has been accused of using personification too freely. Make a list of all the examples of this figure you can remember.

3. What is meant by indirect object, passive voice, superlative degree? Give examples from the poems you have studied.

4. Describe, with a plan, the battle of Blenheim.

5. Under what circumstances was Scotland united to England?

6. Where and what are the following?—Adriatic, Ladoga, Ebro, St. Gothard, Moselle, Majorca, Lombardy.

7. What rivers flow into the Mediterranean?

8. (*a*) Express the difference between $\frac{1}{12}$ of £1 and $\frac{1}{17}$ of a guinea as a fraction of half a crown. Ans. $\frac{1}{17}$.

(*b*) A can do in 7 days a piece of work which B and C, whose rate of working is equal, can do together in 4 days. How long will A and B take to do the work?
Ans. $3\frac{1}{11}$ days.

(*c*) A room 27 feet 6 inches long and 15 feet 9 inches wide is to be covered with floorcloth $1\frac{3}{4}$ yards wide. How many yards are required, and what will be the cost at 2s. 8d. per yard? Ans. $27\frac{1}{2}$ yards; £3, 3s. 4d.

(*d*) Two persons take steps of 2·21 and 1·95 feet. If they

start in step, how far will they walk before they are in step again? Ans. 33·15 feet.

9. Write an essay on "The Scenery of Ireland."

10. (*a*) Give the scale names and mental effects of—

m, f, s, l, t

(*b*) Name the intervals—

t_1-f, f-t, m-l, r-t

(*c*) Write over each note and rest its value in pulses and fractions of a pulse:—

| d : -.r | m : - | f : s.l | : s | m : -.r | d : - ‖

First Year.

1. Analyse the following, and parse words in italics:—

"*When* God arises with an awful frown
To punish lust or pluck presumption *down*,
He *will be found* impartially *severe*,
Too just to wink, or speak the *guilty clear*;"

or,

"*Strange* that *such* folly *as* lifts bloated man
To eminence *fit only* for a god,
Should ever *drivel* out of human lips,
Even in the cradled weakness of the world."

2. Give the various forms in which the prefixes *con* and *ob* are found, and give an example of each in a word.

3. What is comparison of adjectives? What adjectives cannot be compared?

4. What progress did the Reformation make during the reign of Henry the Eighth? What was the king's attitude to the movement?

5. What were:—Field of the Cloth of Gold, Pilgrimage of Grace, Dissolution of Monasteries, Statute of Six Articles?

6. Say what you can of the character of the trade with Persia and Asia Minor and Western Europe.

7. What do you know of Afghanistan and its political importance?

8. (*a*) A watch which is set correctly at noon indicates 10 minutes after 9 the same evening, when the true time is 10. What is the true time when the watch indicates 11 on the same evening? Ans. 12 o'clock.

(*b*) Two pumps are employed to empty a full reservoir, holding 4,800,000 gallons. One pump throws out 150 gallons, the other 350 gallons per minute. A stream discharges into the reservoir 20,000 gallons per hour. The first pump breaks down after working 18 days. How long will the second pump then take to empty the reservoir? Ans. 20 days.

(*c*) The gross income of an estate is £5520. What is the net income after paying income-tax at 6d. in the £, and rates to the amount of 18¾ per cent. on the gross income? Ans. £4347.

(*d*) How far may I travel in a coach which goes at the rate of 8 miles per hour, starting at 10 a.m., in order to return on foot to the starting-place at the rate of 3½ miles per hour by 32 minutes past 2 p.m.?
Ans. $10\frac{2}{3}$ miles.

9. Write an essay on "The Reformation."

10. (*a*) Rewrite the following without change of key:—

d r l ˢd m l_1 r t_1 d m l ˢd^1 d^1

(*b*) Write the following in two-pulse measure, using the same number of measures:—

d : - : - | m : r : d | l : - : s | f : - : - | m : r : - | d : : ‖

(*c*) Name the intervals formed by each of the following notes with each of the others:—

r fe ta d^1

Second Year.

1. Analyse the following, and parse words in italics:—

"*As when* a scout
Through dark and desert ways with peril *gone*
All *night*, *at last* by break of cheerful dawn
Obtains the brow of *some* high-climbing hill,
Which to his eye discovers *unaware*
The goodly prospect of some foreign land,
Such wonder seized, *though after heaven seen*,
The spirit malign."

2. Explain the following allusions:—*Weeds of Dominic; reliques; from Paneas to Beersaba; the fleecy star that bears Andromeda far off Atlantic seas; Hesperian gardens.*

3. Take any one of Milton's contemporaries, and say what you can of his life and works.

4. Say what you can of the industrial revolution in the latter half of the eighteenth century.

5. How do you account for the depression which followed the close of the wars with Napoleon?

6. Write a short essay on "The Commonwealth of Australia."

7. Give as detailed an account as you can of one of the following:—(*a*) Gold-mining, (*b*) sheep-farming, (*c*) the Great Barrier Reef in Australia.

8. (*a*) Find the cost of papering the walls and ceiling of a room whose height is 12 feet, length 16 feet, and breadth 13 feet, the papering of the wall costing 9d. a square yard, and that of the ceiling 4½d. a square yard. Ans. £3, 6s. 8d.

(*b*) Find the cube root of 529475129. Ans. 809.

(*c*) Find the present value of £8195 due 9 months hence at 3¼ per cent. Ans. £8000.

(*d*) At what time between 9 and 10 o'clock will the hands of a watch be in a straight line opposite to each other?
Ans. $16\frac{4}{11}$ minutes past 9.

9. Write an essay on some modern invention.

10. (*Boys*)—

(*a*) Divide $z^2 + 1 + \frac{1}{z^2}$ by $z - 1 + \frac{1}{z^2}$.

Ans. $z + 1 + \frac{1}{z}$.

(*b*) Simplify—

(i.) $\frac{1}{(a+b)^2} - \frac{1}{b^2-a^2} - \frac{1}{(a-b)^2}$;

(ii.) $\frac{(2a-3b)^2-a^2}{4a^2-(3b+a)^2} + \frac{4a^2-(3b-a)^2}{9(a^2-b^2)} + \frac{9b^2+a^2}{(2a+3b)^2-a^2}$;

(iii.) $\left\{\frac{a+b}{2(a-b)} - \frac{a-b}{2(a+b)} + \frac{2b^2}{a^2-b^2}\right\} \frac{a-b}{2b}$.

Ans. $\frac{a^2-4ab-b^2}{(a+b)^2(a-b)^2}$; 1; 1.

(*c*) Solve—

(i.) $\frac{1}{x-1} + \frac{2}{x-2} = \frac{3}{x-3}$;

(ii.) $\frac{2}{x-1} - 10x = 9$;

(iii.) $\frac{bx+ay}{a} = c = \frac{ax-by}{b}$.

Ans. $\frac{3}{2}$; $1\frac{1}{10}$, or -1; $x = \frac{2ab}{a^2+b^2} \cdot c$, $y = \frac{a^2-b^2}{a^2+b^2} \cdot c$.

11. Give, as concisely as you can, the ranges of children's voices.

12. Explain the terms *legato*, *leggiero*, *a tempo*, *marcato*.

CORRESPONDENCE: RULES.

To ensure an answer in the next issue, queries must be sent by the 15th of each month.

Name and address of sender, with coupon of current number of THE PRACTICAL TEACHER (and *nom de plume* if desired), must be enclosed.

As a rule, all replies will appear in the Correspondence Column; but any one desiring an immediate reply may obtain it by enclosing a stamped addressed envelope.

All communications and queries with regard to the PUPIL TEACHERS' AND SCHOLARSHIP COURSE should be addressed to "Mr. A. T. FLUX, The Bays, Belvedere, Kent."

ANSWERS TO CORRESPONDENTS.

Bellona.—Your case is a very common one just at present. I do not think that you should devote all the time to the Certificate work. If you allow one year for that, it should be ample. I should advise you to start for the L.L.A. You can obtain all particulars from the University of St. Andrews. I think you might find something more useful than Latin.

Puzzled.—See notes above, and a special article on the question.

H.S.—Your query is answered above. It depends upon yourself. If you possess a good memory and determination, it can be easily done.

(*Other correspondents answered by post.*)

NOTES ON "QUENTIN DURWARD."

(N.B.—The pages refer to the New Century edition of the novel published by Messrs. T. Nelson and Sons, 35 Paternoster Row, London, E.C. 2s.)

The Author.—Walter Scott was born in Edinburgh in 1771, and was educated at the High School and University of his native town. His tastes, from a very early age, led him to read all the poetry, legends, and mediæval tales which he could lay hands on. The account given in *Waverley* of the hero's early studies is, to a large extent, autobiographical. It was in 1802 that he published his *Minstrelsy of the Scottish Border*, which brought him before the public as a poet; but it was the *Lay of the Last Minstrel*, which appeared in 1805, which placed him in the front rank of poets. This was followed by *Marmion*, *Lady of the Lake*, *Lord of the Isles*, *Rokeby*, and other poems, which increased his reputation as a poet. But the growing fame of Byron led Scott to take a new line, and in 1814 *Waverley* appeared anonymously, and at once seized the popular taste. The reasons which led the author to write anonymously were fully explained by him later on; but for many years—till 1827, in fact—the personality of the "Wizard of the North" was unknown. The secret was kept with great care. For some time his publisher was the only participant, and as everything was copied from Scott's MSS. before being sent to the printers, all attempts to fix the name of the author by means of handwriting were defeated.

The success of *Waverley* led to a constant flow of similar works, some sixty volumes altogether appearing. *Quentin Durward* was published in 1823, and was the seventeenth book of the series. The "Waverley Novels" brought wealth and fame to the author; but he became involved in the failure of his printers, Messrs. Ballantyne and Co., and was left deep in debt. With untiring energy, and in the hope of paying off the huge deficit, he still worked on, till, in 1831, death ended his labours, and he passed away at his beloved Abbotsford.

This is not the place to attempt any appreciation of his work. The unanimous praise of the whole civilised world, for an entire century, speaks for itself.

Quentin Durward was, as we have said, the seventeenth of the series, and is certainly one of the finest of the historical novels. The scene, for the first time, was laid abroad, and deals with an interesting period of French history, when the romanticism and chivalry of the Dark Ages were being replaced by extended trade and commerce and a new line of thought. Louis the Eleventh ascended the French throne in 1461. The state of the country is described in chap. i. The King of France was scarcely more powerful than his vassals—the Duke of Burgundy, the Duke of Bretagne, the Duke of Anjou, etc. These nobles ruled their dominions as absolute sovereigns, and barely acknowledged the overlordship of the king. In 1465 they united their forces and attacked Paris. An indecisive battle was fought at Montlhery, near Paris, and Louis was forced to sign a peace, the terms of which he had no intention of keeping. The whole of his reign was spent in intriguing and plotting to put down the power of his subjects and make himself supreme, and in this he was, to a great extent, successful. It was part of this plan which led him to visit Charles of Burgundy; but though his visit retarded rather than advanced his purpose, he more than regained lost ground during the next few years. Charles finally attempted to conquer Switzerland, but was defeated and killed at Nancy.

It is into the midst of this intriguing and plotting that the hero steps. The tale presents a powerful picture of life at that time, although it is not, historically speaking, strictly accurate. Scott did not hesitate to introduce situations and events which never occurred, or to alter the date of other events to render the story more attractive; but he freely admitted this.

The chief inaccuracy, or rather alteration in the course of events, is in the final chapters. Louis was at Peronne in 1468; the revolt of the people of Liége took place then, but the bishop was not killed by De la Marck till 1482. The latter could not, therefore, have been killed in the assault. As a matter of fact, he was beheaded at Utrecht in 1485.

CHAPTER I.

Page 1. *Foreign yoke.* By the Treaty of Troyes, 1420, Henry the Fifth of England was to succeed to the French throne.

2. *Knight-errantry.* By the laws of chivalry, a knight was bound to succour the weak, punish the evil-doer, and speak the truth. He generally devoted his life and service to some lady, whose slightest glance was a command. The ridiculous side of chivalry is satirised in *Don Quixote*.

4. *Arbitrary divisions of society.* Society was then divided into classes—nobles and commons—which were as carefully observed as the castes of India. (See pp. 550, 552, etc.)

5. *Machiavellian.* Cunning, treacherous. From Niccolo Machiavelli of Florence, who, in his book *The Prince*, teaches that a ruler is justified in using any treachery to maintain his position over his subjects.

5. *Repartees.* Witty answers.

6. *Appanage.* The property which belonged to him personally.

7. *Gangrene.* A sore which refuses to heal, and gradually eats away the flesh.
Free Companies. Bodies of dissolute soldiery who sold their services to the highest bidder, and were generally famous for their debauchery, cruelty, and greed.
Scotched. Wounded. Compare, "We have scotched the snake, not killed it" (*Macbeth*).

8. *Flanders.* What is now Belgium. This country became independent in 1831.

CHAPTER II.

10. *Cher.* A tributary of the Loire.
Plessis-les-Tours. The favourite residence of Louis the Eleventh.

11. *Hawking gauntlet.* As hawks were carried on the wrist, a thick leather glove was necessary to protect the flesh from the bird's talons.

12. *Benedicite. Lat.* Bless ye!
Bohemian. See note on p. 555.
Gossip. From the Anglo-Saxon *god-sib*, a sponsor at baptism; then a companion; then a talkative companion.

13. *Break a proverb*—that is, "He who is born to be hanged will never be drowned."
Mort Dieu. "God's death," contraction of "By God's death."
Halidome. Anglo-Saxon. Holy power.

14. *Moulinet.* A windmill. Modern French, *moulin*.

15. *Jerkin.* A close-fitting coat or waistcoat.

16. *Loretto.* In Macerata, Italy. A shrine of the Virgin, famous for miraculous cures, to which pilgrimages were paid. There were several "Lorettos."
Cadet. Younger son of a noble family.

17. *After the custom of my countrymen.* The Scots, from their national animosity to England, became friendly with France, and were always ready to help that country. Many private individuals sought service abroad when it became necessary to leave Scotland. The last considerable batch left after the rebellion of 1745.
Pasques-dieu. A favourite oath of Louis. (See below.)
Bracman. A freeman of the hills.
By our Lady of Embrun. Most of the oaths of this period were invocations to God, the Virgin, or some particular saint. Compare Zounds = By God's wounds; Gadzooks = By God's looks.
Fier comme un Ecossois. Proud as a Scot.

18. *Schelm.* Villain, rogue.
Paladin. The paladins were the knights of Charlemagne, famous for their prowess.

19. *Ducat.* A coin issued by a duke. A gold ducat was worth about 9s.

20. *Take a mass.* Attend service.

21. *Decoy-duck.* A duck placed on water to attract wild ducks within the reach of a sportsman's gun.

22. *Sacerdotal garments.* Dress worn while conducting services.
Emblazonments. Paintings or carvings.

23. *Hedge-bill.* A large, heavy knife used in trimming hedges.
Calthrops. Balls with projecting spikes, one of which points upwards in whatever position the ball is thrown. Formerly scattered before cavalry to lame their horses.
Demesne = domain or property.

CHAPTER III.

25. *Battlemented.* Provided with spaces along the top through which bowmen could shoot.
Chevaux-de-frise. A beam filled with spikes to keep off horses.
Donjon-keep. The square tower forming the centre of a castle, and containing the dungeons.

26. *Portcullis.* A strong iron gate which rose vertically, and could be dropped instantaneously.

29. *Braes of Angus*—that is, the hills of Forfar.
Brogue. Shoe.
To-name. An additional name or nickname, derived either from some personal peculiarity or the place of birth—for example, Wat of Harden, Lochiel Dhu.
Nomme de guerre. A war name. Very possibly an assumed one.

31. *Doddered.* Covered with growths, such as mistletoe.

33. *Scutcheon.* A shield. The *Fleur-de-lis* (lily-flower), the markings on the French national flag.

CHAPTER IV.

34. *Pâté de Perigord.* Pasty of partridges.
Gastronome. A glutton.
Lotus-eaters. Those who ate of the lotus tree forgot all their past, and lived in dreamy pensiveness, careless for the future.
Ragout. A dish of hashed meat.
Petit point de l'ail. Slight flavour of garlic.

35. *Darioles.* Pastry filled with cream.

36. *To raise the devil.* Spirits were called up by using certain words—for example, Abracadabra.

37. *Gaberdine.* A long cloak.

39. *Mahomet's coffin.* Said to be suspended in mid air in the Hadjirah of Medina, being of iron, between two powerful magnets. It is not, however, suspended at all.

41. *Petty minutiæ.* Little details.
Melpomene. The muse of tragedy.
Vieux routier. An old stager; one with experience.

42. *Throw down his gage*—that is, give challenge to fight.

44. *Auberge.* Inn.

45. *Syndic.* A chief magistrate.

46. *Gillie.* A Scottish man-servant or attendant.
Elixir. A compound sought for by the alchemists which would have the power of turning base metals into gold.

47. *Plebeian.* A commoner—that is, not a gentleman. Lat. *plebs* = the common people.
Hanap. A large drinking-cup.

49. *Vernâl*, for *Auvergnat.* A red wine.

50. *Cabaret.* An inn; tavern.

52. *Troubadours.* The wandering minstrels who composed and sang songs of chivalry. Provence, in the south of France, was famous for its troubadours.
Bishop. Sir Henry, professor of music in Edinburgh.
Stephens. Miss, a celebrated vocalist.

OUR CERTIFICATE COURSE FOR 1902.

BY GEORGE COLLAR, B.A., B.SC.,
Head-Master of the Stockwell Pupil Teachers' School.

TEST QUESTIONS ON LAST MONTH'S WORK.

THEORY OF TEACHING.

1. WHAT are the chief difficulties met with in teaching spelling? How would you group irregular words so as to diminish those difficulties as much as possible?

2. Which lessons afford the best opportunities for training the imagination of children?

ARITHMETIC.

What is a ratio, a duplicate ratio, a sub-duplicate ratio? Show that a ratio of greater inequality is diminished by adding the same quantity to each of its terms.

ENGLISH LITERATURE.

1. Give a summary of the fifth Act of *Macbeth*.

2. Explain the words—*wrack, battle, earls, epicures, my fell of hair.*

FRENCH.

1. Write the past definite indicative and the present subjunctive of *finir* and *recevoir*.

2. Translate into English :—

Nous continuâmes à marcher toute l'après-midi, par cette grande chaleur, dans la poussière des chemins. Plus nous avancions, plus nous voyions devant nous d'autres régiments d'infanterie et de cavalerie. On se tassait pour ainsi dire de plus en plus, car derrière nous il en venait encore d'autres. Vers les cinq heures, nous arrivâmes dans un village où les bataillons et les escadrons défilaient sur un pont de briques.

3. Translate into French :—

The slaves of early English times were prisoners of war, men convicted of crime, debtors, children of slaves, and imported slaves. Before the Norman Conquest slavery had almost vanished, and the trade in imported slaves was ended.

SYLLABUS AND NOTES FOR JANUARY.

ENGLISH COMPOSITION.

Study the rules for the number and order of words (Nichol, Part IV., chaps. ii. and iii.). The advice given in these two short chapters is most valuable, and all who wish to acquire a good style should follow it.

Prepare essays on :—

1. The Pleasure to be obtained from Reading.
2. Outdoor Games.
3. Newspapers.

THEORY OF TEACHING.

(*a*) Study the methods of teaching English grammar and composition (Collar and Crook, chap. ix.).

The relation between these two cannot be too clearly understood by the student: the former is the science, the latter the art based upon it. The six objects we have in view in the study of language are set out in chap. ix., and all depend upon the fundamental property of language—namely, that it is a vehicle of thought. In the same chapter the difficulties which arise in the teaching of grammar are set out, and we would particularly emphasise the one that arises from confusing words with the things they denote. Not only is there a confusion between *names* and *objects*, but between *gender* and *sex*, between *verbs* and *actions*, *tense* and *time*, and between the relations of words and the relations of things—for example, *qualification* and *description*. The student who has access to *Teaching and Organisation* should read Dr. Abbott's essay on teaching grammar. It contains many useful ideas.

The scheme of grammar teaching set out in the chapter appointed for this month's study not only lays a good foundation for a knowledge of grammar, but is intended to be worked in conjunction with the scheme for teaching composition.

The three pages devoted to the methods of teaching poetry should be carefully studied. It is much to be feared that the effect of the usual method of teaching poetry is to fill children with disgust for the higher forms of literature. Students who can refer to Professor Hale's *Longer English Poems* are strongly advised to make a careful study of the introduction, which deals with the subject of the teaching of English in our schools.

(*b*) *Psychology.*—Study Dexter and Garlick, chaps. xiv.-xvii. From the teacher's point of view, chap. xiv. is very important, and the student who makes herself acquainted with its teaching will avoid the common error of thinking that the mere use of such exercises as paper-folding is the same thing as teaching on true "kindergarten principles."

(*c*) Locke's *Thoughts on Education*, Sections XIX.-XXIII.—With regard to children's toys, there is a great deal of sound common sense in Locke's remarks. From an educational point of view, the elaborate toys now made for children are a mistake. Very little is left for the child to exercise his imagination upon, and, with the exception of building blocks (and even these seem going out of fashion), nothing affords scope for the exercise of the child's constructive powers.

ARITHMETIC.

Study the theory of division into proportional parts; averages and percentages.

The principle of dividing a quantity into parts which are proportional to given numbers is that each part is the same fraction of the whole amount as the corresponding number is of the *sum* of the numbers. Thus, in dividing £2, 5s. in the proportion 4 : 5, we take $\frac{4}{4+5}$ of £2, 5s., and $\frac{5}{4+5}$ of £2, 5s. Students often make a mistake when the given numbers are fractions—for example, Divide £3, 5s. in three parts in the proportion $\frac{1}{2} : \frac{1}{3} : \frac{1}{4}$. The parts will *not* be respectively $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$ of £3, 5s., for then the sum of the parts would be greater than the whole, but $\frac{\frac{1}{2}}{\frac{1}{2}+\frac{1}{3}+\frac{1}{4}}$ of £3, 5s., $\frac{\frac{1}{3}}{\frac{1}{2}+\frac{1}{3}+\frac{1}{4}}$ of £3, 5s., and $\frac{\frac{1}{4}}{\frac{1}{2}+\frac{1}{3}+\frac{1}{4}}$ of £3, 5s. Simplifying these fractions by *multiplying* numerator and denominator by 12, we obtain $\frac{6}{13}$ of £3, 5s. (that is, £1, 10s.), $\frac{4}{13}$ of £3, 5s. (that is, £1), and $\frac{3}{13}$ of £3, 5s. (that is, 15s.).

So-called "partnership" problems are merely cases of division into proportional parts.

A mistaken idea of the nature of "inverse proportion" is very prevalent. If two quantities are *inversely* proportional to 2 and 3, they are in the ratio 3 : 2; but the meaning of inverse proportion is not that the terms are to be written in the *inverse order*, but that each term should be inverted. When there are only two terms, the erroneous idea that the terms written in inverse order constitute inverse ratio makes no practical difference, because the inverse of the ratio 2 : 3 is $\frac{1}{2} : \frac{1}{3}$—that is, $\frac{3}{6} : \frac{2}{6}$, or 3 : 2. But when there are more terms than two this is not the case. Thus, as the time taken to do a certain piece of work is inversely proportional to the number of men engaged, the times taken by 7, 11, and 15 men will be as $\frac{1}{7} : \frac{1}{11} : \frac{1}{15}$—that is, 165 : 105 : 77. and *not* 15 : 11 : 7. This point is very important.

The only difficulty likely to be met with in questions on percentages is in the matter of "covered insurance," or that system of insurance by which the amount for which the goods are insured is equal to the sum of the value of the goods and the premium.

ENGLISH LITERATURE.

We must now study the play afresh, in order to understand the characters, and we will begin with that of Macbeth himself. As our space is limited, we shall be able to give only the merest outline, illustrated by a few quotations; but the student should amplify this, and read the play through several times, so as to find more quotations bearing on the point. Almost any one who has heard of Macbeth will be prepared to say that he was a murderer, usurper, and cruel tyrant; but the careful student will find that Shakespeare reveals much more than this. On studying the play carefully, we see that Macbeth is naturally of a kindly disposition, "full o' the milk of human kindness" (i. 5). He had a certain amount of ambition, but the incentive to crime came not from within but from without. His weakness of character, his wife's prompting, and his superstitious reliance on the weird sisters, led him to the fulfilment of their prophecies. Lady Macbeth says of him,—

> "Thou wouldst be great;
> Art not without ambition, but without
> The illness should attend it: what thou wouldst highly,
> That wouldst thou holily."

And again,—

> "Hie thee hither,
> That I may pour my spirits in thine ear" (i. 5).

Then she stings him on with,—

> "Art thou afeard
> To be the same in thine own act and valour
> As thou art in desire?"

Hazlitt contrasts Macbeth with Richard the Third. Both

were usurpers, murderers, and tyrants; yet Macbeth's evil deeds were committed through influences from without, but Richard's through his own innate villainy. "Macbeth himself appears driven along by the violence of his fate, like a vessel drifting before a storm: he reels to and fro like a drunken man, he staggers under the weight of his own purposes and the suggestions of others.....He is not equal to the struggle with fate and conscience. He now 'bends up each corporal agent to this terrible feat' (i. 7); at other times his heart misgives him, and he is cowed and abashed by his success. 'The attempt, and not the deed, confounds us.'" (*Hazlitt*). Macbeth seems to have had a genuine love for his wife, and a fatherly instinct which made him desire to leave his gains to children of his own, and regret that he should have committed his great crime for the benefit of Banquo's offspring,—

> "For Banquo's issue have I filed my mind;
> For them the gracious Duncan have I murdered;
> Put rancours in the vessel of my peace
> Only for them" (iii. 1).

Macbeth was a man very sensible to the stings of conscience and remorse. Richard the Third would have had no difficulty in saying "Amen" to a prayer he heard after committing a crime, but not so Macbeth:—

> "Wherefore could not I pronounce 'Amen'?
> I had most need of blessing, and 'Amen'
> Stuck in my throat" (ii. 2).

It is this same disposition which makes him see the ghost of Banquo at the feast. So, in the melancholy speech in v. 3, he recognises that his life has been a failure, even from his own point of view:—

> "I have lived long enough: my way of life
> Is fallen into the sear, the yellow leaf," etc.

Another point that must strike us in Macbeth's character is that although the courses he adopts seem always to be prompted from without, and to be thrust upon him by circumstances, yet he has a bold relf-reliance which makes him depend on his own powers for the execution of his plans:—

> "I am settled, and bend up
> Each corporal agent to this terrible feat" (i. 7).
>
> "For mine own good,
> All causes shall give way" (iii. 4).
>
> "No boasting like a fool;
> This deed I'll do before this purpose cool" (iv. 1).
>
> "Throw physic to the dogs; I'll none of it.
> Come, put mine armour on; give me my staff" (v. 3).

Euclid.

Women.—Prepare to the end of III. 19.

Men.—Revise Books I. and II., and work the following exercises:—

1. If AB be divided in C so that the square on AC is equal to the rectangle AB . BC, show that the sum of the squares on AB and CB is equal to three times the square on AC.

2. If X is the middle point of the side BC of a triangle ABC, show that BAC will be an obtuse, a right, or an acute angle according as AX is less than, equal to, or greater than half BC.

3. EF is a straight line drawn parallel to the base BC of the triangle ABC. If BE and CF intersect in P, show that the line through A and P bisects both EF and BC.

4. If one parallelogram lies entirely within another, show that it has a smaller perimeter.

5. Find points E and F on the sides CB and CD of the square ABCD such that AEF forms an equilateral triangle.

6. Show that the sum of the squares on the four sides of a parallelogram is equal to the sum of the squares on the two diagonals.

Trigonometry.

We must now take up the study of the relations between the sides of a triangle and the functions of the angles. The most important are the following:—

(i) *The sides are proportional to the sines of the opposite angles.*

This is proved by dropping a perpendicular from one angle on to the opposite side.

(ii) *Each side is equal to the sum of the product of each side into the cosine of the angle which it makes with the first side.*

This is proved by the application of Euclid II. 12 to the same construction as (i) above.

So, if we use A, B, and C to represent the angles of the triangle, and a, b, and c the sides respectively opposite to them, we can express important relations by the following formulæ:—

$$\text{(i) } \cos A = \frac{b^2 + c^2 - a^2}{2bc}.$$

In proving this we use the same construction, and apply Euclid II. 12 or II. 13 according as A is obtuse or acute.

$$\text{(ii) } \sin^2 \frac{A}{2} = \frac{(a + b - c)(a - b + c)}{4bc}.$$

Or, if we adopt the convention $2s = a + b + c$, this becomes

$$\sin^2 \frac{A}{2} = \frac{(s - b)(s - c)}{bc}.$$

$$\therefore \sin \frac{A}{2} = \sqrt{\frac{(s - b)(s - c)}{bc}}.$$

$$\text{(iii) So also } \cos^2 \frac{A}{2} = \frac{(a + b + c)(b + c - a)}{4bc} = \frac{s(s - a)}{bc},$$

$$\text{or } \cos \frac{A}{2} = \sqrt{\frac{s(s - a)}{bc}}.$$

(iv) Combining these two results, we deduce

$$\tan \frac{A}{2} = \sqrt{\frac{(s - b)(s - c)}{s(s - a)}}.$$

(v) Remembering that $\sin A = 2 \sin \frac{A}{2} \cos \frac{A}{2}$, we deduce

$$\sin A = 2 \sqrt{\frac{(s - b)(s - c)}{bc}} \times \sqrt{\frac{s(s - a)}{bc}}$$

$$= \frac{2}{bc} \sqrt{s(s - a)(s - b)(s - c)}.$$

Political Economy.

Read Mrs. Fawcett on "Capital," Section I., chap. iii., and Section III., chap. iii., so as to get a clear idea of the exact nature of capital, and of its claims to share in the distribution of wealth produced. Remember that wealth, money, capital are not synonymous terms. Capital is that portion only of wealth which is employed in the production of wealth. Money is not necessarily capital, but it can be converted into capital by being employed in production. Some forms of capital can easily be withdrawn and made non-capital. Thus, a man has money lying idle (non-capital). He buys a horse and cart to carry on his business: this is capital. Again, he may sell the horse and cart (capital), and keep the money in a drawer: it then becomes non-capital. If, instead of buying a horse and cart, he had spent the money in advertisement, he could not realise this part of his capital by itself; but the fact that money thus spent is capital, if spent judiciously, is shown by the increased price that would be paid for the whole business if it were sold. So also the money spent in laying telegraph cables and in constructing railways must be regarded as capital; although, if they were sold in order to remove the material, they would only realise a small fraction of their prime cost. The manner in which industry is limited by capital must be carefully worked out, and also the fallacy of supposing that unproductive expenditure of the rich classes is necessary for the welfare of the poor. The story of the broken window shows up the absurdity of saying that it is "good for trade." Work out cases to prove that when wealth is employed as capital it must of necessity be consumed. It is kept up, therefore, not by preservation, but by continual reproduction.

French.

Read the first seventeen chapters of *Le Voyage autour de ma Chambre*, Nelson and Sons' edition, and work Exercises 1 to 8 at the end.

Prepare the formation of tenses of the verb.

When we say that certain tenses are formed from certain other tenses, we are using a phrase which is not in all cases historically correct. Thus, although we can prove that the future tense has actually been formed from the present infinitive, we have no evidence that the imperfect has been actually derived from the present participle. Our remarks must therefore be considered simply as devices for enabling the student to give all the other parts of a verb when he knows a few chief forms. We will deal first with the regular verbs, and afterwards show in what respects the irregular verbs depart from the rules.

In a verb there are five forms, known as primitive tenses (or principal parts)—namely, the present infinitive, present participle, past participle, present indicative (first person singular), and preterite indicative (first person singular). From these all other parts of the verb may be formed as follows:—

1. From the present infinitive, (*a*) the future, and (*b*) conditional.

2. From the present participle, (*a*) the *plural* of the present

indicative, (*b*) the imperfect indicative, and (*c*) the present subjunctive.

3. From the past participle, all the compound tenses, including the whole of the passive voice.

4. From the present indicative, (*a*) the *singular* (second and third persons) of the present indicative, and (*b*) the imperative.

5. From the preterite indicative, (*a*) the rest of that tense, and (*b*) the imperfect subjunctive.

1. (*a*) As we have already stated, the future is actually derived from the present infinitive, and there is a close connection between the English future and the French future, although in English this tense remains compound, and in French it has become a simple tense. In old English, "shall" implied a duty or necessity—thus, "I shall write" meant originally, "it is my duty to write;" but the special force of "shall" was lost in course of time, and it is now used as a simple auxiliary, void of meaning of its own, and merely used to mark the future tense. So, in early French, the verb *avoir* was used with an infinitive to imply duty or necessity—*J'ai donner*, "I have to give;" but in time this force was lost, and the verb *avoir* came to be written after the infinitive, and in time joined to it so as to become a mere inflection, and in the cases in which this verb had more than one syllable the root syllable *av-* was dropped in the process. This is the case in the first and second persons plural of the future, and in the whole of the conditional.

Je donner-ai, tu donner-as, il donner-a, nous donner(av)ons, vous donner(av)ez, ils donner-ont.

The student will now, perhaps, form the future of *finir, recevoir,* and *rendre* by adding *-ai, -as, -a, -ons, -ez, -ont* to the infinitive. In the case of *finir* this will give the correct forms, but in the last two cases the influence of the ear makes itself felt in the form. If the student tries to say *je recevoir-ai* and *je rendre-ai* several times quickly, he will find that it is much easier to omit the *oi* and *e* than to put them in, particularly if he puts the proper stress on the last syllable. The ear then soon shows how these forms come to be *je recevrai* and *je rendrai*, and also why we have *nous donnerons* instead of *nous donner(av)ons.*

The following form deals with all these changes in one rule:—To form the future from the infinitive, change *-r, -oir,* or *-re* into *-rai, -ras, -ra, -rons, -rez, -ront.*

(*b*) Just as the future was formed by adding the *present* tense of the verb *avoir* to the infinitive of a verb, so the conditional was formed by adding the *imperfect.* From what has been said above the forms are evident, and we may give a similar rule for forming the conditional:—To form the conditional from the infinitive, change *-r, -oir,* or *-re* into *-rais, -rais, -rait, -rions, -riez, -raient.*

It is important to notice that the imperfect is related to the conditional in the same way as the present is related to the future, not only in the matter of derivation, but also in the construction of conditional sentences. Thus we say, *Si j'ai de l'argent je vous en* donnerai, "If I have any money I will give you some" (that is, "If I *have* the money I *have* the duty of giving you some"); but, *Si j'avais de l'argent je vous en* donnerais, "If I had any money I would give you some" (that is, "If I *had* any money I *had* the duty of giving you some").

2. (*a*) The plural of the present indicative is formed from the present participle, and not from the singular of the present, as one might suppose from a study of the first conjugation only. The difference is very marked in the second conjugation, owing to the presence in the present participle of the syllable *iss,* of which we shall speak again later on. To form the plural of the present indicative from the present participle, change *-ant* into *-ons, -ez,* and *-ent.* Notice that this last inflection is always mute, and consequently the preceding vowel may have to be modified to enable it to bear the tonic accent, of which we shall say more when we deal with the influence of sound on form. Consequently, for *ils re-ce-vent,* which could take no stress, we say and write *ils reçoivent,* the *e* changing into *oi,* which necessitates the use of a cedilla under the *c* to maintain its original sound.

(*b*) The imperfect indicative is formed from the present participle by changing *-ant* into *-ais, -ais, -ait, -ions, -iez, -aient.*

(*c*) The present subjunctive is formed from the present participle by changing *-ant* into *-e, -es, -e, -ions, -iez, -ent.* As the first three and the last of these endings are mute, the preceding vowel in some cases must be modified, as explained in 2 (*a*). Thus the combination *que je re-ce-ve,* although regular enough for the eye, is an impossible one to sound, containing as it does a succession of mute *e*'s, and, therefore, no syllable capable of bearing the stress or tonic accent. To obviate this we say and write *que je reçoive,* so also *que tu reçoives, qu'il reçoive,* and *qu'ils reçoivent;* but as the termination in the first and second persons plural can take a stress, there is no necessity to modify the last vowel of the stem—*que nous recevions, que vous receviez.*

3. The compound tenses are formed from the past participle by using it with the appropriate tense of the auxiliary. In practice no real difficulty is felt in forming any required compound tense, but students often neglect to associate the compound tenses with their *names* as well as with their meanings; hence many mistakes are made in examinations. The following is a list of the compound tenses, with their corresponding simple tenses—that is, the tense of the auxiliary used in forming them:—

Simple.		Compound.
* Present	corresponds to	Perfect (or past indefinite).
* Imperfect	,,	Pluperfect.
Preterite (or past definite)	,,	Past anterior.
Future	,,	Future perfect.
Present (conditional)	,,	Perfect (or anterior) conditional.

* In both the indicative and subjunctive moods.

4. From the present indicative (first person singular) we form the rest of the singular, and the imperative.

5. (*a*) The rest of the preterite is formed from the first person singular by changing *-s* (or *-i* in the first conjugation) into *-s, -s, -t, -^mes, -^tes, -rent.* Notice the circumflex accent in the first and second persons plural of the preterite of all verbs. This is due to the fact that these two forms come from the contracted form of the Latin perfect.

(*b*) The imperfect subjunctive is formed from the preterite by changing *-s* (or *-i*) into *-sse, -sses, -^t, -ssions, -ssiez, -ssent.* Notice the circumflex accent which is found over the third person singular of this tense in all verbs. Notice the resemblances between the present and imperfect subjunctive in the second conjugation, and see how they are brought about.

OUR CERTIFICATE COURSE FOR 1903.

If we seem to devote a smaller amount of space to the work for 1903 than to that for 1902, it is not because we have the interests of the 1903 candidates less at heart than those of the candidates for 1902, but a great deal of the work is common to both courses; hence those who are working for their certificates in 1903 should do the work given above in composition, arithmetic, and French. We must leave to our readers the task of preparing their own reading, repetition, drawing, and needlework. Steady and regular practice is necessary in order to bring these subjects up to a high state of efficiency when the test comes.

Theory of Teaching.

Study the first two chapters of the text-book, and, in connection with the building and equipment of a school, examine in detail the plan and equipment of your own. As there are many things you will be unable to alter, do not do this in a carping spirit (possibly the building and fitting of your school were the best possible under the circumstances); but, for your own information, consider every particular, so as to be able to give advice, if asked later on, with regard to the building and equipment of a school under other circumstances. This will prove a very practical way of studying this part of the subject.

English Language and Literature.

Read carefully through *Richard the Third,* so as to get a good general idea of the plot and structure of the play.

Prepare the first two chapters of Nesfield.

English History.

Study the history to the end of the Roman period. One matter to which special importance should be attached is the relation of the Roman occupation to present-day conditions. In what ways have the Romans exerted any influence over modern England? There were many, of which the following were the chief:—

1. By their material monuments—roads, camps, weapons, sculptures, pavements, and architectural remains—they exerted a refining and civilising influence which persisted through the dark times of the Saxon and Danish invasions.

2. Our agriculture and horticulture owe much to them, as several plants, including the pea and the cherry-tree, were introduced by them.

3. One of the most distinguishing features of Roman politics was the system of municipal self-government which they established wherever they went. Perhaps we are not far out in considering the development of municipal self-government as one of the most remarkable political movements of the last fifty years in England, and this development owes much to Roman influence.

4. In the "City Companies" and "Guilds" we see a copy of the "Colleges of Operatives," which exerted such an influence on trades in Rome and her colonies.

5. Many of our ideas of royal prerogatives come from the constitutional position of the Roman emperor (and Rome was under an emperor during the whole of the occupation of Britain)—

(*a*) The idea that the sovereign impersonates the country.

(*b*) That the sovereign is the "fountain of honour," and can bestow nobility—for example, the court (= *cohors*) meant a band of chosen companions; counts (= *comites*) were noble in virtue of being companions of the emperor.

6. Representative assemblies were held, and although they had very little power, yet the fact that such assemblies were held must have had a moral effect on the founders of our representative parliaments.

7. The laws of all civilised countries owe a deep debt of gratitude to Roman law, which all candidates for legal offices are required to study, and which has been called "the noblest and most valuable production of the uninspired human intellect."

8. Of social customs, we may mention that our "fairs" and "feasts" (*feriæ* and *festa*) are Roman both in origin and name, as well as the custom of keeping them in booths and tents. We wear mourning, sprinkle dust on the coffins of our friends, set "urns" on tombstones, and speak of the mortal remains as "ashes." We use Roman names for the months, celebrate New-Year's Day with wishes and gifts, use bridecake (*confarreatio*) at weddings, keep birthdays, dress our statues in Roman attire, and perpetuate the *Floralia* in our May-Day rejoicings.

9. Roman literature has exerted a wonderful influence on our own, although we can hardly consider this as working through the Roman occupation.

Geography.

Study the introductory papers on geography by Dr. Herbertson which have appeared in the recent numbers of The Practical Teacher.

LONDON MATRICULATION.

June 1902.

"HELPS" FOR THE LATIN PAPERS.

by C. J. Phillips, M.A.,
Stockwell Pupil Teachers' Centre.

ANSWERS TO TESTS FOR DECEMBER.

(*The English translation given in these answers will be almost literal.*)

Chapter v.

1. (*a*) "And yet all men cannot be Scipios or Maximi, that they should remember the stormings of cities, battles by land or sea, wars carried on by them (or) triumphs."

(*b*) "For foolish people put down their own weaknesses and their own fault to old age, (a thing) which that man, of whom I have just made mention, Ennius, used not to do:

"Just as a mighty horse, who often at the last turn of the course has won the Olympic prize, now rests, worn out by old age."

(*c*) "And indeed, when I consider (the matter) in my mind, I find four reasons why old age appears to be wretched: one, that it calls (us) away from carrying on our business; another, that it makes (a man's) body more feeble; a third, that it keeps (him) from almost all pleasures; the fourth, that it is not far away from death. Let us see, if you please, how great and how just each one of these reasons is."

2. *Nefas* is an indeclinable adjective, qualifying the noun clause *miseram fuisse talem senectutem*, and modified itself by *dictu*. *Nefas dictu*, "wrong to be said"—that is, "an improper thing to say."

Actae, gen. fem. sing., agreeing with *aetatis*; from *actus*, the past partic. pass. of *ago, -ere, ēgi, actum*.

Senio, abl. sing.; from *senium*, "old age," or "the feebleness of old age."

3. (*a*) *Accepimus Platonem, annos octoginta natum, scribentem esse mortuum.*

(*b*) *Harum causarum unamquamque justam esse affirmavit.*

Chapter vi.

1. (*a*) "To the old age of Appius Claudius there also came in addition (the fact) that he was blind; yet he—as the feeling of the Senate leaned towards making peace and truce with Pyrrhus—did not hesitate to say those (words) which Ennius has carried on in the lines."

(*b*) "Those, therefore, bring nothing forward who say that old age is not employed in practical affairs; and they are like any people who should say that the steersman does nothing in managing the ship, since some climb the masts, others run to and fro along the deck, others draw off the bilge, (but) he sits quiet in the stern, holding the tiller, (and) does none of the things which the young men (do)."

(*c*) "For he would make use neither of the skirmish, nor the assault, nor the spear from a distance, nor the sword at close quarters, but of strategy, design, counsel, (for), unless these things were in the aged, our ancestors would not have named the supreme council the Senate."

2. (*a*) *Cato negavit se ante de Carthagine vereri desiturum, quam deletam illam esse cognovisset.*

(*b*) *Si ad centesimum annum vivam, nunquam senectutis meae me paeniteat.*

3. *Paeniteret*, third pers. sing. imperf. subj. act.; from *paenitet* (it repents), impersonal verb: for example, *paenitet me huius rei*, "it repents me of this thing"—that is, "I am sorry for it."

Labefactatas, acc. fem. plur., agreeing with *respublicas*; from *labefacto, -are, -avi, -atum*.

Chapter vii.

1. (*a*) "Surely, then, you do not suppose that, when he was advanced in years, he was in the habit of calling the man, who was Aristides, Lysimachus?"

(*b*) "Sophocles composed tragedies up to the most advanced age; and, since he seemed to be neglecting his household affairs on account of this preoccupation, he was summoned to trial by his sons, in order that—just as, by our custom, fathers who mismanage their affairs are wont to be forbidden to control their property—the judges might remove him from the (management of) the family estates, on the ground that he was of unsound mind."

(*c*) "Come now, to leave on one side those divine pursuits, I could name country-bred Romans from the Sabine district, neighbours and acquaintances of my own, in whose absence hardly any of the more important works are ever carried on, neither in sowing, nor reaping, nor storing the produce."

2. (*a*) *Equidem senes omnia quae curent meminisse arbitror.*

(*b*) *Judices interrogabo utrum hoc, quod nuper scripsi, poema senescentis hominis esse videatur.*

3. *Obtruisset* is the subjunctive in a dependent question. It is pluperfect, because it refers to a time before that of the main verb *audivi*.

Removerent, subjunctive of purpose. In time it follows *vocatus est*, which here is past.

Omittamus, subjunctive of purpose. Present time, because *possum* is present.

Serat, subjunctive in dependent question. Present, because *dubitat* is present.

Chapter viii.

1. (*a*) "Welcome rather than disagreeable! For as wise old men are charmed with young men who are gifted with good dispositions, and the old age of those who are courted and liked by the young men is made more easy to bear, so (too) the young delight in the advice of old men, by which they are led to the pursuit of the virtues, and I do not imagine that I am any less acceptable to you than you are to me.

"But you see how old age not merely is not feeble and inactive, but also is busy and always doing and planning something, of such a nature, in fact, as has been the tendency of the individual in his past life. What of those who learn something fresh, as we see Solon boasting in his verses, (Solon) who says that he grows old learning something new every day, and as I too have done, who, in my old age, have studied Greek literature? And indeed I have seized on it so greedily—as though longing to satisfy an unceasing thirst—that those very facts were known to me which you see me use now as instances. And when I heard that Socrates did this in the case of the lyre (that is, learnt it in his old age), I could have wished to do the same; for the ancients used to learn (to play) on the lyre: in literature, at any rate, I have worked hard."

2. *Eumpse*, acc. masc. sing., old form from *ipse*.

Moliens, nom. fem. sing. (agreeing with *senectus*) pres. partic. act.; from *molio, -ire, -ivi, -itum*.

Fidibus, abl. plural of *fides, -ium*. It goes grammatically with *canere* or some such verb understood.

Grammar and Accidence for January.—The pronouns of all kinds, especially the forms and uses of *qui, quis, quidam, aliquis, alter*.

A paper on Grammar will be given in the February number.

ANSWERS TO TEST QUESTIONS SET IN DECEMBER NUMBER.

1. *Num tu illam epistulam scripsisti?*
2. *Venies-ne nobiscum, annon?*
3. *Nonne credis patrem tuum mortuum esse?*
4. *Nescio quis sis, unde venias, quid velis, quo eas.*
5. *Ex imperatore quaerebam utrum esse aliquid periculi crederet, necne.*

SUBJECT FOR JANUARY.

Conditional Sentences.—The simplest way to master conditional sentences in Latin is to make quite sure that you know when to use the subjunctive mood in them.

There are two kinds of conditional sentences which require the subjunctive mood in "direct speech":—

1. When the sentence implies that the condition is not realised—for example, "If I were you, I should do so-and-so."

2. When the condition is very vague and hypothetical—for example, "If you were to see him, what should you do?"

All other kinds are expressed by the indicative mood—for example, "If he comes, I will tell him;" "If you are there, why don't you answer?" "If ever I saw Gaius, I used to avoid him."

So, then, if your conditional sentence is in "direct speech"—that is, if it is not dependent on or subordinate to some verb—then ask yourself this question: First, Does this sentence *imply* that the condition is not realised? If it does, use the subjunctive mood in both parts of the sentence. Secondly, Is the condition definite and vivid, or is it vague and hypothetical? If it is vague and hypothetical, use the subjunctive mood.

For example:—

(*a*) Unrealised condition in *present time*—"If I were Caesar, I should not be here," *Si ego Caesar, essem non adessem.*

(*b*) Unrealised condition in past time—"If I had been there, I should have seen you," *Si ego adfuissem, te vidissem.*

(*c*) Vague or hypothetical condition—"If he were to come to Rome, I should flee," *Si ille Romam veniat, ego fugiam*, or *Si ille Romam venerit, ego fugerim.*

We have, then, the following rules:—Unrealised conditionals in present time take the imperfect subjunctive. Unrealised conditionals in past time take the pluperfect subjunctive. Vague or hypothetical conditionals take the present or perfect subjunctive. *All others* take the indicative in the conditional part of the sentence. In "*reported speech*," of course, even these will take the subjunctive.

One other point in detail is important. English is a very careless language about its tenses. Latin is far stricter in this respect. Be very careful, then, to think what time is really *meant* by the English sentence.

Test Sentences.

1. If you come with us, we shall be back to-morrow.
2. Don't answer, if you don't know.
3. Had I known who you were, I should have obeyed you instantly.
4. Should I not have arrived, don't start at once.
5. If I saw my brother, I shouldn't know what to do.
6. Wretched man! if you had only told me.
7. If he came to your house in your absence, he ought not to have forgotten the book.
8. Where would you go to, if you left the city?
9. He says that, if you come, he will give you the money.
10. He does not want to make a speech, but if you were to ask him to do so, I am sure you would gain your request.

WORK FROM CICERO FOR THIS MONTH.

Chapter ix.

1. Translate:—
   (*a*) § 28.
   (*b*) *Ego L. Metellum.....non requireret.*
2. Parse:—*elephanti, provecta, stipata.*
3. Put into Latin:—
   (*a*) Cato used to say that he no more wished for the strength of his youth in his old age, than he had wished for the strength of a bull when he was young.
   (*b*) Cyrus, in his dying speech, said he had often wondered whether his old age had been feebler than his youth.

Chapter x.

1. Translate:—
   (*a*) *Quartum ago annum.....ante quam essem.*
   (*b*) *Cursus est certus.....percipi debeat.*
2. Put into Latin:—
   (*a*) Agamemnon, in Homer, said that he would rather have one man like Nestor than ten like Aias.
   (*b*) Do you really believe that Milo used to carry an ox on his shoulders?

Chapter xi.

1. Translate:—
   (*a*) *Resistendum.....non opprimantur.*
   (*b*) *Ita enim senectus.....in suos.*
   (*c*) *Septimus mihi liber.....vesperi.*
2. Parse:—*exstitisset, instilles, emancipata.*
3. Put into Latin:—
   The old man said that these were the exercises of the mind, and that without them we should in our old age regret the strength of our youth.

Chapter xii.

1. Translate:—
   (*a*) *Quod quo magis.....consequi posset.*
   (*b*) *Ut intellegeretis.....commercium.*
2. Parse:—*auferi, praestabilius, eicerem, exoratus, neutiquam.*
3. Put into Latin:—
   (*a*) There is no crime to which the love of pleasure does not urge men.
   (*b*) We do not know for certain whether it was against his own will that Cato, when censor, turned Flaminius out of the Senate.

CIRCULAR TO TRAINING COLLEGES FOR SCHOOLMISTRESSES.

NEEDLEWORK.

BOARD OF EDUCATION, WHITEHALL, S.W.,
December 1901.

SIR,—The Board of Education have had under consideration the arrangements for the examination in needlework of students in training colleges.

In the Outline Course for Teacher's Certificate appended to Circular 454 it is stated that "needlework may be dropped at the end of the first year at the discretion of the college authorities." The intention of this provision is that each college shall decide for all its students collectively whether they will or will not discontinue needlework at the end of their first year as part of their approved course of instruction. When a college drops needlework at the end of the first year, it may be necessary and proper to continue to give instruction in that subject to students who are not proficient, but such instruction will be outside the range of the approved curriculum.

The arrangements for the current academical year, 1901-2, will be as follows:—

Students of the second year will take the exercise in needlework set at the Certificate Examination in July, and will also be tested by the directress at her visit of inspection, as laid down, in April last, in Circular 450, which provides as follows:—

The Directress of Needlework will put questions to and hear lessons from individual students, selected as heretofore by herself. She will compare the marks assigned to those students by herself with those awarded for knowledge of needlework to the same students by the college authorities, and by the standard of comparison thus obtained will compute the individual mark to be assigned to each of the students in the college.

In those colleges which notify their intention of allowing their students to drop needlework at the end of their first year of training, an exercise in needlework will be set also to the first year students at some convenient date, probably at the beginning of July, when the students now in their second year are examined. The Directress of Needlework will also pay a visit of inspection to the colleges at some time between May and July, or in October or November, 1902, when she will pursue a plan similar to that which has been laid down for second year students in Circular 450. The combined results of these tests will be noted and taken into account when the students are classed upon the results of the final examination in the subjects of their two years' course of instruction. (Circular 454.)

The arrangements to be made for the ensuing year, 1902-3, will be considered hereafter. (See Circular 454.)

I am to request that you will inform the Board of Education, at your earliest convenience, whether your students now in their first year of training are taking up a two years' course of needlework or a one year's course only.—I have the honour to be, Sir, your obedient servant,

G. W. KEKEWICH.

OUR QUERY COLUMN.

RULES.

1. Each correspondent is restricted to *one* question.
2. Each query must be accompanied by the name and address of the correspondent, and the *coupon* which appears on the back wrapper of the current number of the Journal.
3. CORRESPONDENTS MUST IN ALL CASES STATE THE SOURCE FROM WHICH THEIR QUERY HAS BEEN OBTAINED.

The Editor reserves to himself the right to decline to answer any question which is, in his judgment, unsuited to the Magazine.

C. W. Thynn.—If $\frac{y+z}{pb+qc} = \frac{z+x}{pc+qa} = \frac{x+y}{pa+qb}$, show that $\frac{2(x+y+z)}{a+b+c} = \frac{(b+c)x+(c+a)y+(a+b)z}{bc+ca+ab}$.

If we are given $\frac{A}{B} = \frac{C}{D} = \frac{E}{F} = \ldots$, then each of these ratios is equal to $\frac{A+C+E+\ldots}{B+D+F+\ldots}$.

For, let $k = \frac{A}{B} = \frac{C}{D} = \frac{E}{F} = \ldots$

Then $A = kB$, $C = kD$, $E = kF \ldots$

$\therefore A + C + E + \ldots = k(B + D + E + \ldots)$

$\therefore \frac{A+C+E+\ldots}{B+D+F+\ldots} = k = \frac{A}{B} = \frac{C}{D} = \frac{E}{F} = \ldots$

Now $\frac{y+z}{pb+qc} = \frac{a(y+z)}{a(pb+qc)} = \frac{a(y+z)}{pab+qca}$,

$\frac{z+x}{pc+qa} = \frac{b(z+x)}{b(pc+qa)} = \frac{b(z+x)}{pbc+qab}$,

and $\frac{x+y}{pa+qb} = \frac{c(x+y)}{c(pa+qb)} = \frac{c(x+y)}{pca+qbc}$.

Hence $\frac{2(x+y+z)}{(p+q)(a+b+c)} = \frac{a(y+z)}{pab+qca} = \frac{b(z+x)}{pbc+qab} = \frac{c(x+y)}{pca+qbc}$.

$\therefore \frac{2(x+y+z)}{(p+q)(a+b+c)} = \frac{a(y+z)+b(z+x)+c(x+y)}{pab+qca+pbc+qab+pca+qbc}$

$= \frac{(b+c)x+(c+a)y+(a+b)z}{(p+q)(ab+bc+ca)}$.

$\therefore \frac{2(x+y+z)}{a+b+c} = \frac{(b+c)x+(c+a)y+(a+b)z}{ab+bc+ca}$.

(Kindly refer to Rule 1.)

M. M.—Give a geometrical instance (*a*) of a quantity (*y*) that varies directly as another (*x*); (*b*) of a quantity (*y*) that varies inversely as another (*x*). (S.K. Mathematics, 1901.)

(*a*) The areas (*y*) of triangles having the same vertical height (*h*) vary directly as their bases (*x*).

For area of a triangle = ½ base × vertical height.

$\therefore y = \frac{1}{2}xh$.

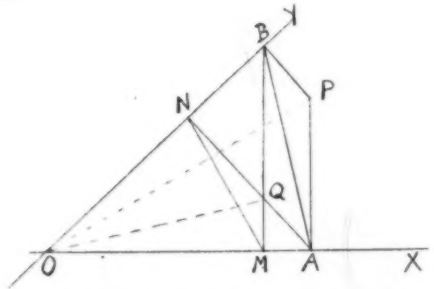
But $\frac{h}{2}$ is here constant. $\therefore y$ varies directly as x.

(*b*) The vertical heights (*y*) of triangles of equal area (A) vary inversely as their bases (*x*).

For $A = x \times \frac{y}{2}$. $\therefore y = 2A \times \frac{1}{x}$.

But here A is constant. $\therefore y$ varies inversely as x.

Boot.—A line of given length slides between two fixed lines; find the locus of the intersection of the perpendiculars to the fixed lines from the extremities of the sliding line, and of the perpendiculars on the fixed lines from the extremities of the sliding line.



Let OX, OY be the fixed lines, and AB the length of the sliding line. Let the perpendiculars AN, BM, drawn from A and B on OY, OX, intersect in Q; and let the perpendiculars to OX, OY at A, B intersect in P. Join OP, OQ.

OBPA is a cyclic quadrilateral, therefore ∠ BAO = ∠ BPO. And ∠ OBP = a right angle = BMA. Hence the triangles BAM, OPB are equiangular, and

AB : BM : : OP : OB.

$\therefore$ AB : OP : : BM : OB.

But BM moves parallel to itself.

$\therefore$ BM : OB is constant.

Hence AB : OP is constant; and since, by hypothesis, AB is of given length, OP is also a fixed length, and P describes a circle whose centre is at O.

Again, BAMN is a cyclic quadrilateral.

$\therefore$ ∠ MBA = ∠ MNA.

Also, ONQM is a cyclic quadrilateral.

$\therefore$ ∠ MNQ = ∠ QOM.

Hence ∠ MBA = ∠ QOM,

and ∠ BMA = a right angle = ∠ OMQ.

$\therefore$ the triangles QOM, ABM are equiangular,

and AB : BM : : QO : OM.

$\therefore$ AB : QO : : BM : OM.

Hence AB : QO is constant, and Q describes a circle whose centre is at O.

Shad.—Three rigid rods, AB, BC, CD, each of length $2a$, are smoothly jointed at B and C. The system is placed so that the rods AB, CD are in contact with two smooth pegs distant $2c$ apart in the same horizontal line, and the rods AB, CD make equal angles (α) with the horizon. Prove that the tension of the string in AD which will maintain this configuration is $\frac{1}{4}W \operatorname{cosec} \alpha \sec^2 \alpha \{3c/a - (3 + 2\cos^2 \alpha)\}$, where W is the weight of either rod.

Since the relation postulated is one between T and W, we imagine a virtual displacement which involves T and W,

and does not introduce the unknown reaction at the pegs into the equation of virtual work. Thus, let a increase by da without breaking contact of the side rods with the pegs.

The original length of the string is

$$l = 2a(1 + 2\cos a).$$

The work done by the tension T in the virtual displacement is $-Tdl = T4a \sin a\, da$.

The depth of the centre of gravity of the lowermost rod below the line of pegs is originally $(c - a)\tan a$. In the virtual displacement this is increased by

$$(c - a)\frac{d(\tan a)}{da} = (c - a)\sec^2 a\, da.$$

The work done *by* gravity on this rod in the virtual displacement is $W(c - a)\sec^2 a\, da$.

The height of the centre of gravity of each of the side rods above the line of pegs is originally $\tan a\{a\cos a - (c - a)\}$; that is, $\{a(1 + \cos a) - c\}\tan a$. In the virtual displacement this becomes increased by

$$\begin{aligned}&\{[a(1 + \cos a) - c]\sec^2 a - \tan a \sin a\, a\}da\\ &= \{a\sec^2 a[1 + \cos a - \sec^2 a\cos a] - c\sec^2 a\}da\\ &= \sec^2 a\{a(1 + \cos^3 a) - c\}da.\end{aligned}$$

The work done *against* gravity on the side rods is therefore

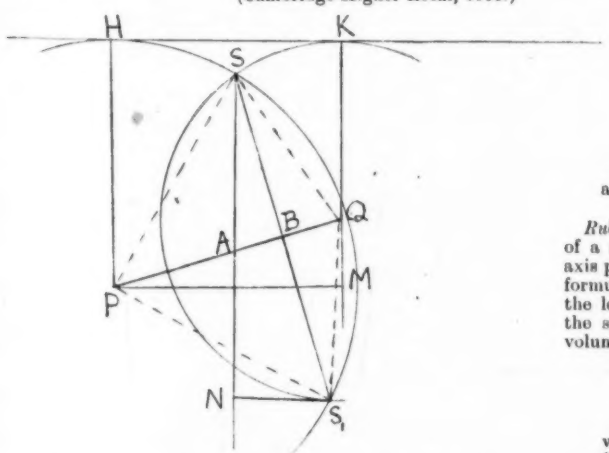
$$2W\sec^2 a\{a(1 + \cos^3 a) - c\}da.$$

Hence the equation of virtual work is

$$\begin{aligned}&T4a\sin a\, da + 2W\sec^2 a\{a(1 + \cos^3 a) - c\}da\\ &\quad - W(c - a)\sec^2 a\, da = 0.\\ \therefore T &= \frac{W}{4}\operatorname{cosec} a\sec^2 a\left[\frac{c}{a} - 1 - 2(1 + \cos^3 a) + 2\frac{c}{a}\right]\\ &= \tfrac{1}{4}W\operatorname{cosec} a\sec^2 a\left\{3\frac{c}{a} - (3 + 2\cos^3 a)\right\}.\end{aligned}$$

X.Y.Z.—A ball projected with given velocity passes through a given point at a horizontal distance a from the point of projection, and at a vertical distance b from the point of projection. If h is the vertical distance between the highest points of the two possible paths, and x is the horizontal distance between the two given points, show that $ax = 2bh$.

(Cambridge Higher Local, 1901.)



Let P be the point of projection, and Q the other given point. Let PH denote the vertical height through which a body falling freely from rest must fall in order to acquire a velocity equal to the given velocity. Then, by a fundamental theorem in parabolic motion, the directrix of the two possible trajectories of the ball is HK, the horizontal through H.

Draw QK perpendicular to HK.

From P and Q, with radii PH, QK, draw circles intersecting in S, S_1. Then S and S_1 are obviously the force of the trajectories of the ball.

Let the vertical through S and the horizontal through S_1 intersect in N, and let the vertical through Q and the horizontal through P intersect in M. Let PQ intersect SN, SS_1 in A, B.

By Euclid I. 8, $\angle SPQ = \angle S_1PQ$; and then by Euclid I. 4, $\angle PBS = \angle PBS_1$. Hence ABS_1N is a cyclic quadrilateral, and therefore $\angle PAN = \angle SS_1N$. But $\angle PAN = \angle PQM$. Hence the triangles PQM, SS_1N are similar, and therefore $PM : MQ = SN : NS_1$; that is, $PM \cdot NS_1 = SN \cdot MQ$. But SN is the vertical distance between foci, therefore SN is double the vertical distance between the vertices—that is, the highest points—of the trajectories. Now, by the question, $S_1N = x$, $NS = 2h$, $PM = a$, $MQ = b$.

Hence the equation,

$$PM \cdot NS_1 = SN \cdot MQ,$$

may be written,

$$ax = 2hb.$$

J. Cunnison.—Solve the following equation :—

$$a(1 - \cos\theta) = b(1 - \sin\theta).$$

(Honours Leaving Certificate, 1901.)

$$\begin{aligned}\frac{1 - \sin\theta}{1 - \cos\theta} &= \frac{a}{b}.\\ \therefore \frac{\left(\sin\frac{\theta}{2} - \cos\frac{\theta}{2}\right)^2}{2\sin^2\frac{\theta}{2}} &= \frac{a}{b}.\\ \therefore \left(\frac{\sin\frac{\theta}{2} - \cos\frac{\theta}{2}}{\sin\frac{\theta}{2}}\right)^2 &= \frac{2a}{b}.\\ \therefore \left(1 - \cot\frac{\theta}{2}\right)^2 &= \frac{2a}{b}.\\ \therefore 1 - \cot\frac{\theta}{2} &= \pm\sqrt{\frac{2a}{b}}.\\ \therefore \cot\frac{\theta}{2} &= 1 \mp \sqrt{\frac{2a}{b}}\\ &= \frac{\sqrt{b} \mp \sqrt{2a}}{\sqrt{b}}\\ &= \frac{b \mp \sqrt{2ab}}{b}.\\ \therefore \tan\frac{\theta}{2} &= \frac{b}{b \mp \sqrt{2ab}}\\ &= \frac{b(b \pm \sqrt{2ab})}{b^2 - 2ab}\\ &= \frac{b \pm \sqrt{2ab}}{b - 2a}.\\ \therefore \frac{\theta}{2} &= n\pi + \tan^{-1}\frac{b \pm \sqrt{2ab}}{b - 2a}.\end{aligned}$$

(You will see that by adopting the foregoing method we avoid the source of error you have noticed.)

Rub.—Write down a formula for the volume of the segment of a sphere. A sphere is pierced by a cylindrical hole whose axis passes through the centre of the sphere. By means of your formula express the volume of the bead thus formed, in terms of the length of the axis of the cylindrical hole and the radius of the sphere. If the length of the axis be 0·75 inch, find the volume of the bead.

The volume of the zone of a sphere is given by

$$\frac{\pi h}{2}\left(R^2 + r^2 + \frac{h^2}{3}\right), \quad . \quad . \quad . \quad . \quad . \quad (1)$$

where R and r are the radii respectively of the two circles forming the ends of the zone, and h is the height of the zone.

In words: *To the sum of the squares of the radii of the two ends add one-third the square of the height; multiply the sum by the height and by* $\frac{\pi}{2} = 1{\cdot}5708$.

If one of the circular areas be zero, we obtain from Eq. (1) the volume of a spherical segment. Thus, if $r = 0$, then from (1) we have—

$$\text{Volume of segment} = \frac{\pi h}{6}(3R^2 + h^2).$$

When a sphere is pierced by a cylindrical hole passing through the centre of the sphere, then in Eq. (1) $R = r$, and we obtain—

$$\text{Volume of zone} = \frac{\pi h}{2}\left(2r^2 + \frac{h^2}{3}\right) \quad . \quad . \quad . \quad (2)$$

To obtain the volume of the bead, we must subtract the volume of the cylindrical hole from Eq. (2).

$$\therefore \text{volume of bead} = \frac{\pi h}{2}\left(2r^2 + \frac{h^2}{3}\right) - \pi r^2 \times h$$

$$= \frac{\pi h^3}{6}.$$

As $h = \cdot 75$,

$$\text{volume of bead} = \frac{\pi \times (\cdot 75)^3}{6} = 0{\cdot}2209 \text{ cub. in.}$$

Therm.—Water is forced through a porous plug under a pressure of 50 kilograms per square centimetre above the atmospheric, and emerges with negligible velocity at the pressure of the atmosphere. Assuming that there is no loss or gain of heat from external sources, find the rise in temperature of the water if 427 kilogram metres are equivalent to 1 kilogram calorie.

During the flow of water from one place to another the total energy of a pound of water remains constant. The total energy remaining constant is expressed by

$$h + \frac{p}{w} + \frac{v^2}{2g} = \text{constant}, \quad . \quad . \quad . \quad . \quad . \quad (1)$$

h being the height of the place above some datum level, p the pressure, w the weight of unit volume of fluid, and v the velocity.

If E_1 denote the energy at the entrance to the porcelain plug, then, since v is negligible, we obtain from (1)

$$E_1 = h + \frac{p}{w}.$$

Similarly, denoting the atmospheric pressure by p', the energy E_2 with which the water emerges is given by

$$E_2 = h + \frac{p'}{w}.$$

$$\text{Hence loss of energy is } E_1 - E_2 = \frac{p - p'}{w}.$$

If all this is changed into heat, then, denoting the rise in temperature by t, we have—

$$t \times Vw = \frac{(p - p')V}{427}.$$

$$\therefore t = \frac{p - p'}{427 \times w}, \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

where V denotes the volume of water emerging from the plug, and therefore Vw is its weight.

Neglecting p' (the atmospheric pressure), then Eq. (2) becomes

$$t = \frac{p}{427 \times w}.$$

As p is 50 kilograms per square centimetre, we have, by substitution,

$$t = \frac{50 \times 100 \times 100}{427 \times 1000} = \frac{500}{427} = 1{\cdot}17.$$

Deci.—Board of Education Examination, Subject V.—Books recommended:—

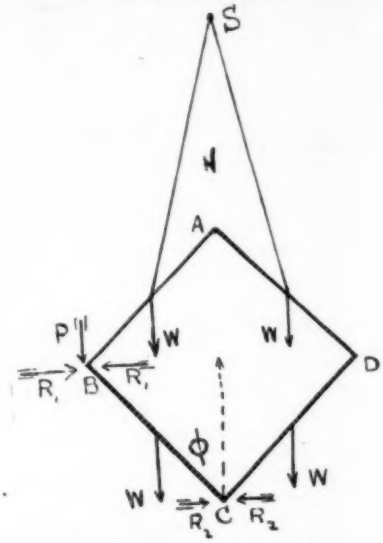
Stage 4.—Descriptive Geometry—*Elements of Descriptive Geometry*, Millar (Macmillan). Geometry—Taylor's *Euclid* (Pitt Press). Solid Geometry—Nixon's *Geometry in Space* (Clarendon Press). Geometrical Conics—Cockshott and Walter's *Geometrical Conics* (Macmillan). Spherical Trigonometry—M'Clelland and Preston's *Spherical Trigonometry*, Part I. (Macmillan).

Stage 5.—Descriptive Geometry—as in Stage 4. Co-ordinate Geometry—Loney's *Co-ordinate Geometry* (Macmillan). Calculus—*Differential Calculus for Beginners*, Edser (Nelson), and *Integral Calculus for Beginners*, Edwards (Macmillan).

J. Scrivens.—The following parts of the books named should be read in preparing for the examination in Stage 5:—

Loney's *Co-ordinate Geometry*, chaps. i. to viii.; chap. x.; chap. xi., Arts. 235 to 238; chaps. xii. and xiii.; chap. xiv., Arts. 335 to 343; chap. xv., Arts. 348 to 358. Edser's *Book for Beginners*. Edwards's *Differential Calculus for Beginners*, Arts. 1 to 55, and chap. xiii. Edwards's *Integral Calculus for Beginners*, chaps. i. to vi., chaps. ix. and x.

Perplexed.—Four heavy rods, equal in all respects, are freely jointed together at their extremities so as to form the rhomboid ABCD. If the rhomboid be suspended by two strings attached to the middle points of AB and AD, each string being inclined at an angle θ to the vertical, prove that in the position of equilibrium the angles of the rhomboid will be 2θ and $180 - 2\theta$.



Let AB, BC, CD, and DA be the four heavy rods freely jointed at the angular points A, B, C, D.

Let S be the point of suspension of the two strings, each string making an angle θ with the vertical.

If W denotes the weight of each rod, the total downward force will be 4W, and is also the magnitude of the vertical components of the two strings.

$\therefore$ resolving vertically, $2T \cos\theta = 4W$.

$$\therefore T = \frac{2W}{\cos\theta}, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

where T denotes the tension in each string.

To find the angles of the rhomboid, it is necessary to consider the equilibrium of the rods separately. To do this, we notice that the rod CD must act on the rod BC through the pin connecting the two. This force action must be horizontal, for it is only then that it can be equal and opposite, and, in addition, symmetrical for the two rods. We may denote it by R_2. Similarly we may denote the horizontal and vertical components of the force on the pin at B by R_1 and P. For the rod BC we may, in the usual manner, resolve horizontally and vertically, and take moments about some convenient point.

Resolving vertically, $R_1 = R_2$ . . . . . (2)

Resolving horizontally, $P = W$ . . . . . (3)

Taking moments about C, we have

$$R_1 \times 2l \cos\phi + Wl \sin\phi = P \times 2l \sin\phi, \quad . \quad . \quad . \quad (4)$$

where $2l$ denotes the length of the rod, and ϕ the angle made by the rod with the vertical.

In a similar manner, for rod AB take moments about A.

$$R_1 \times 2l \cos\phi + P \times 2l \sin\phi + Wl \sin\phi = Tl \sin(\phi - \theta). \quad . \quad (5)$$

From equations (3) and (4) we obtain

$$2R_1 \cos\phi = W \sin\phi \quad . \quad . \quad . \quad . \quad . \quad (6)$$

From (3), (5), and (6),

$$W \sin\phi = T \sin(\phi - \theta) - 3W \sin\phi.$$

Substituting from (1), we have

$$W \sin\phi = \frac{2W}{\cos\theta} \sin(\phi - \theta) - 3W \sin\phi.$$

$$\therefore 4 \sin\phi \cos\theta = 2 \sin(\phi - \theta)$$

$$= 2 \sin\phi \cos\theta - 2 \cos\phi \sin\theta.$$

$$\therefore 2(\sin\phi \cos\theta + \cos\phi \sin\theta) = 0.$$

Or $\sin(\phi + \theta) = 0$.

Hence $\phi + \theta = 0°$, or $180°$.

$\therefore \phi = -\theta$, or $180° - \theta$.

As the angle ϕ denotes the half-angle of the rhomboid, it follows that the angles of the rhomboid are 2θ and $180 - 2\theta$.

Solutions may be had by post to queries sent by *Monachus*, *Mack*, *Pend*, *H.A.*, *J. Calver*, *Molim*, *Puzzled*, *Diomedon*. Replies to *J. B. Holmyard* and *Undecided* will appear next month.

OUR SCIENCE SECTION

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PHYSIOGRAPHY.

(ADVANCED AND HONOURS.)

The Constituents of Meteorites (abstracted from *The Journal of Geology*):—

1. **Glass.**—This is an abundant constituent of the stone meteorites, few, if any, being entirely without it. It is variously distributed—now as vein matter, now scattered through the substance of chondri, now enclosed in the substance of a single mineral, and now enclosing various minerals. Like the glass of terrestrial lavas, it seems to be the result of cooling so rapidly as to prevent differentiation and orderly crystallisation of the magma.

2. **Chromite.**—Nearly all stone meteorites give a small percentage of Cr, which is usually considered as being present as $FeO\,Cr_2O_3$. It is identical with terrestrial chromite in composition and properties.

3. **Amorphous Carbon.**—Meteorites of the group known as carbonaceous meteorites, as well as some others, are permeated by a dull, black, pulverulent colouring matter, which is usually left as a residue, sometimes amounting to 2–4½ per cent. of the mass, on treatment of the meteorite with acid. On being heated in air-glow this residue usually becomes lighter in colour, and gives off CO_2. It is, therefore, practically pure carbon. Berzelius and Wöhler believed this carbon to have originated from the decomposition of hydrocarbons. No indications that it had an organic origin have ever been discovered.

4. **Diamond.**—The existence of diamond has been definitely proved in only two meteorites—namely, those of Cañon Diablo and Nowo-Urei. It is found as minute particles or dust left as a residue after dissolving the meteorite in acid. The particles rarely exceed ½ mm. in diameter. They usually are brown or black, but sometimes colourless and transparent. They accompany graphite, amorphous carbon, and often troilite and schreibersite. Knop and Daubrée remind us that the peridotic rocks in which terrestrial diamonds occur most nearly approach meteorites in composition.

5. **Daubréelite.**—This mineral is an iron-chromium sulphide ($FeS_1Cr_2S_3$) peculiar to meteorites. It is found in nearly all the cubic iron meteorites, but never in stone meteorites. It is black in colour, has a black streak of metallic lustre, brittle, but not magnetic, until heated in the reducing flame. It is not attacked by hydrochloric acid, hot or cold, but is completely dissolved by HNO_3 without the separation of free sulphur. This distinguishes it from chromite.

6. **Tridymite.**—This has been positively identified in only one meteorite, its form being that of rounded grains, and its composition being pure silica, with iron oxide and magnesia as impurities.

7. **Lawrencite,** or solid ferrous chloride ($FeCl_2$), which is found in the iron meteorites of Tozewell, Smith Mountain, and Laurens County. Its colour varies from green to brown.

8. **Magnetite** (Fe_3O_4).—Several stone and iron meteorites have been found to contain black magnetic grains soluble in HCl without effervescence to a yellow solution. They constitute 4·57 per cent. of the Shergotty meteorite, and are regarded as magnetite. Magnetic spherules have been dredged up from ocean depths, but these may consist of particles of meteoric iron oxidised to magnetite subsequent to their dropping on the earth.

9. **Oldhamite** (CaS_2).—Grains of this mineral were found by Maskelyne embedded in the enstatite or augite of the Bustee meteorite. It is light brown in colour, transparent when pure, of a specific gravity of 2·58, and of hardness = 4.

10. **Hydrocarbons.**—These are of three classes—namely (*a*) carbons of carbon and hydrogen, (*b*) compounds of CH and S, and (*c*) compounds of CHO. They especially characterise carbonaceous meteorites, which include seven or eight falls of meteorites, black in colour, of low specific gravity, and containing a sensible amount of carbon. The hydrocarbons of the first class are obtained by treating these meteorites with alcohol or ether. They are resinous or waxlike bodies which completely volatilise on heating. They resemble wax ozocerite. A similar substance obtained by Roscoe from the Alais meteorite was of the composition CH_{24}.

Hydrocarbons of the second class are obtained by treating the graphite of iron meteorites and some carbonaceous meteorites with ether. They are fusible and volatile, and of the composition $C_3H_{12}S_3$.

Hydrocarbons of the third class have been obtained from the meteorites of Orgueil and Hessle. The Orgueil residue resembles peat, humus, or lignite; that from Hessle is of the composition $4C_3H_8O_2$.

There is no evidence that life had anything to do with the formation of these hydrocarbons, and we therefore conclude that they were formed by the union of their elements inorganically. The occurrence of these bodies shows that those meteorites in which they occur could not have been subjected to a high temperature subsequent to their formation, and therefore the heating of meteorites during their fall to the earth must in many cases be only superficial.

11. **Other Compounds.**—**Quartz,** occurring only in a very few iron meteorites.—**Pyrites.** This is doubtful.—**Salts soluble in Water.** These include salts of nickel, calcium, magnesium, potassium, sodium, and ammonium sulphates and chlorides.—**Breunnerite.** Found in the Orgueil meteorite, being the only carbonate found in meteorites.

Mineral Aggregates.—Only a few general observations are made. Of the iron meteorites the chief constituents are nickel iron, with schreibersite, troilite, daubréelite, and a few others.

Of the ironstone meteorites the largest quantity are of the so-called pallasites, formed chiefly of chrysolite and nickel iron.

Passing to the stone meteorites, the following groups and weights may be noted:—

A. *Rich in Ca and Mg, with little or no NiFe.*
   1. Augite—chiefly augite. One fall = 0·4 kilogram.
   2. Eukrite—augite and anorthite. Four falls = 91 kilograms.
   3. Shergottite—augite and maskelynite. One fall = 5 kilograms.
   4. Howardite—augite, anorthite, bronzite, and chrysolite. Ten falls = 5 kilograms.

B. *Rich in MgO, with little or no NiFe.*
   1. Bustite—dropside and bronzite. Two falls = 1·7 kilograms.
   2. Chassignite—chrysolite. One fall = 0·9 kilogram.
   3. Chladnite—pyroxene. Four falls = 9 kilograms.
   4. Amphoterite — chrysolite and bronzite. Three falls = 40 kilograms.

C. *Stones rich in MgO.*
   The great majority of falls. They consist of chrysolite, bronzite, nickel iron, and iron sulphide.

Comparison with the Crust of the Earth.—(*a*) **Similarities.**—Elements the same, and combined in same way. (*b*) **Contrasts.**—Water and oxygen, that have played so important a part in the formation of terrestrial compounds, are absent in the case of meteoric compounds. The lack of water is proved by the fresh and unaltered character of the minerals, and by the absence of all hydrous minerals.

Further, zeolites, micas, epidote, tourmaline, and all other

minerals in the formation of which water and water-vapour play a part, are entirely lacking. Similarly, oxygen, at least in excess, is absent from the constituents of meteorites, or otherwise NiFe, schreibersite, etc., would have been oxidised. Again, the rock-forming minerals of the earth, such as quartz, orthoclase, the acid plagioclases, the micas, amphiboles, leucite, and nepheline, are absent from meteorites, or only occur in small quantity; and the same applies to the minerals occurring most largely in meteorites, as they occur but rarely in the crust of the earth.

CHEMISTRY.

(ADVANCED AND HONOURS.)

Manufacture of Lime Salts by means of Calcium Carbide.—Calcium carbide being a substance with great affinity for water, as soon as it is brought into the presence of sodium carbonate, sodium hydrogen sulphate, or sodium hydrogen carbonate, it decomposes these salts. The carbon combines with the hydrogen contained in these bodies to form acetylene. Carbonate or sulphate of lime is then produced, according to which of the bodies is used, by reason of the affinity of the lime contained in carbide for the carbonate or sulphate in the salt employed, and the residue is caustic soda. When calcium carbide is brought into the presence of the acid salts of fruits, the tartrates, citrates, or oxalates of lime are produced, and these may easily be separated and utilised. When it is put into contact with marine plants in the moist condition, valuable substances, such as alkalised chlorides, bromides, and iodides, are obtained, by reason of the action of the moisture upon the carbide.

Reduction of the Manganates of Barium, and Production of Barium Carbide and Metallic Manganese.—The manganates of native baryta, called psilomelanes by the mineralogists, are manganese ores of inferior quality. They may be reduced by coal at a high temperature. The electric furnace may also be employed, or, indeed, any other contrivance giving very high temperatures. Barium carbide and metallic manganese, more or less carburetted, are produced, the percentage of carbon present depending upon the proportions used.

The process is not only applicable to native ores, but also to residues from industrial operations where baryta and a manganese oxide are present. If desired, a small quantity of coal may be added for carburetting the manganese more or less, which, according to Professor Morison, will thus volatilise more rapidly.

Suboxide of Phosphorus.—Substances obtained according to the methods described by Michaelis and Pitsch, and said to be phosphorus suboxide, have been examined by Messrs. C. H. Burgess and D. L. Chapman, who show that these bodies contain a large amount of hydrogen, and that they cannot be regarded as consisting of the suboxide, but as red phosphorus containing hydrogen compounds. The authors show that some of the analytical results of Michaelis and Pitsch indicate that the substances prepared by them contained water, and that the proof of the absence of hydrogen in the substance described by them as a pure suboxide is inconclusive.

As red phosphorus is easily soluble in aqueous alcoholic potash with formation of a red solution, red phosphorus resembles in this respect the supposed suboxide.

The authors conclude that both the properties and the analytical results support the view that the substances hitherto described as suboxides of phosphorus are only impure forms of amorphous phosphorus.

Incrustation from the Stone Gallery of St. Paul's.—Mr. E. G. Clayton contributes an interesting chemical note on this subject to the current *Proceedings of the Chemical Society*. Around what is known as the Stone Gallery, at the base of the dome of St. Paul's Cathedral, is a balustrade of Portland stone, surmounted by a heavy coping stone of the same material. Much of the surface of the stone is greatly weathered, and is coated by a stratum of a gray or black substance, which in some places (especially on the under side of the coping stone) attains a thickness of three-quarters of an inch. This material, which is brittle, and detachable with a knife, has a very rough and irregular surface, is stalagmitic in character, and, though differing in colour, in other respects resembles very closely boiler deposits. It can easily be reduced to a fine gray powder, which, under the microscope, shows no morphological features indicating the presence of fungoid or similar matter.

An analysis of the substance shows it to consist chiefly of hydrated calcium sulphate with some siliceous matter. Calcium carbonate, which might have been expected to be present, is not one of the constituents. What then is the origin of the incrustation? In the immediate vicinity there is no obvious source of gypsum or plaster. It cannot have been blown upwards from the bare leaden roof of the cathedral or floor of the gallery. The stones of the balustrade are cemented, of course, with mortar. Still less likely is it that so much calcium sulphate has found its way from the neighbouring thoroughfares. The sand and soot may, to a great extent, be thus derived, and perhaps a small proportion of the calcium sulphate represents coal-ash transported by wind. But after a careful consideration of all the circumstances, and especially the characteristic appearance of the incrustation, it is suggested that the presence of the main component is principally due to two centuries' solvent and weathering action of rain, charged with sulphurous and sulphuric acids derived from the gases and smoke of innumerable surrounding chimneys. The action exerted by rain beating heavily against the stone in that exposed condition must be very considerable. The deposit of calcium sulphate left by the water dripping and running from the under side of the coping stone has become gradually thicker, just as is the case with stalagmite and calcareous tufa, to which the external features of the incrustation give it a curiously close resemblance. That the weathering influence of rain has been potent, no one examining the surface of the Portland stone can have a moment's doubt.

Acetylene C_2H_2.—With this hydrocarbon most of us are quite familiar, on account of its use as an illuminant. Moreover, we also know that it is commonly, and therefore most easily, prepared by the action of calcium carbide, a substance got from lime and coke by the action of the high temperature obtainable in the electric furnace. Its formula is CaC_2, and all that is necessary to its production is that it should be brought into contact with water, when the following reaction takes place:—

$$CaC_2 + 2H_2O = Ca(OH)_2 + C_2H_2.$$

The only apparatus requisite is a flask fitted with a dripping funnel (see Cartwright's "*Section Two*" *Physiography*, p. 40), and a delivery-tube. The gas is collected by displacement of water, with which it does not combine, and in which it is practically insoluble. The gas is bubbled through lime-water, upon which it has no effect, and is then burnt, and the products of combustion are treated with lime-water to show that carbon dioxide is one of the bodies produced by burning C_2H_2, the other being water, thus—

$$C_2H_2 + 5O = 2CO_2 + H_2O.$$

The odour of the gas should be noted. It is, unfortunately, more offensive, as well as more poisonous, than coal-gas. In addition, it is more explosive, especially if under a pressure of 1½ atmospheres. The brilliance of the flame will be common knowledge to all who have seen a bicycle lamp. It should also be noticed that the flame of C_2H_2 is very smoky, which is caused by the large percentage of carbon present in the substance, it being a rule that such carbon rich bodies do not consume the whole of their carbon when they burn.

The test for C_2H_2 is cuprous chloride, which may be prepared by boiling cupric chloride with copper and HCl. The white chloride is filtered and dissolved in ammonium hydrate. Another convenient method for the preparation of ammoniacal solution of cuprous chloride is to pass SO_2 into a solution containing 90 grams NaCl and about 200 grams of $CuSO_4$ (bluestone). Pour the mixture, when SO_2 is no longer absorbed, into 500 cubic centimetres of water, and then filter. Collect the white precipitate of Cu_2Cl_2, and dissolve it in concentrated NH_4OH. If a current of acetylene is passed through this solution, a red cuprous body—namely, $Cu_2OC_2H_2$ (copper acetylene)—is at once produced. Fit a filter funnel with rubber tubing, and connect it with a wash-bottle containing ammoniacal solution of Cu_2Cl_2, letting the wide mouth of the inverted funnel stand over a bunsen burner, the air-holes of which are open, and which is alight *at the bottom*. To the delivery-tube of the wash-bottle attach an aspirating arrangement (a Winchester quart bottle full of water will do very well), and proceed to aspirate the products of this peculiar combustion of coal-gas through the cuprous chloride. The red cuprous acetylene that results tells that C_2H_2 is produced when a bunsen burner strikes back. It will be noticed that a very peculiar smell accompanies this burning, and in most books we are told that this smell is the odour of acetylene; but that this is not the case the nose of the experimenter very quickly will show. Methane, olefiant gas, and acetylene are all constituents of coal-gas, and the study of these bodies is a necessary preliminary to the study of coal-gas, which will next engage our attention. These bodies also typify scores of other hydrocarbons, that may be arranged under these, as the *methane, the ethylene, and the acetylene series of hydrocarbons*. The members of each series, like the members of the seven periods of Mendelief's periodic classification of the elements, exhibit strik-

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ing resemblances in general properties, together with a gradual change in these properties in ascending from the lower to the higher members of each series. This periodicity of the homologous series of hydrocarbons is a matter to which very careful attention must be paid, and to which we shall therefore devote more serious attention in succeeding papers.

ELECTRICITY AND MAGNETISM.

ADVANCED AND HONOURS STAGES.

BY EDWIN EDSER, A.R.C.S., F.PH.S.

In the syllabus for 1901, issued by the Board of Education, the following passage occurs:—

"Technical Electricity.—Alternative questions will be set in the following subjects:—

"General principles of the construction and description of simple forms of continuous current dynamos and motors.

"Transmission of power.

"Electric lighting by arc and glow lamps.

"General principles and description of the simpler forms of apparatus used in telegraphy and telephony.

"Storage batteries.

"Principles and construction of the simpler forms of electrical or electro-magnetic measuring instruments."

As most of the points in this alternative syllabus are not treated of with sufficient fullness in the ordinary text-books on electricity, and many students do not possess special treatises on the technical side of the subject, a brief consideration of the points enumerated will be given in these columns.

Dynamos and Motors: Introduction.—Faraday discovered that when the number of lines of force passing normally through a coil of wire is altered in any way, there will be an E.M.F. induced in the coil. Let the coil consist of one turn of wire, and let us suppose that the positive direction of lines of force passes through this coil from the side turned toward the observer to the opposite side. Then, *if the number of lines of force passing through the coil is increasing, the E.M.F. induced in the coil will act in a sense opposite to that in which the hands of a clock revolve. The magnitude of this E.M.F. at any instant is equal to the rate at which the number of lines of force is increasing.* In order to obtain a law easily applicable to a dynamo or motor, let us consider Fig. 1. This represents two long bars of copper,

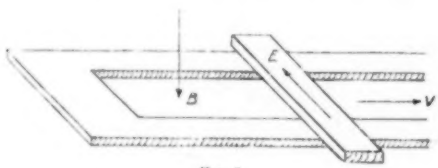

Fig. 1.

joined transversely at one end, and unconnected at the other end. A copper conductor lies across these bars, so that to the left of this conductor we have a closed conducting circuit. Now let us suppose that lines of force are passing vertically downwards through the plane containing the conducting circuit. Let there be B lines of force passing vertically through each square centimetre of this plane. If we move the conductor perpendicular to its length, from left to right (that is, in the direction of V, Fig. 1), we shall be continually increasing the area of the conducting circuit, and therewithal increasing the number of lines of force passing vertically through it.

Since the number of lines of force threading the conducting circuit is increasing, the E.M.F. will act in a sense opposite to that in which the hands of a clock revolve. In other words, the E.M.F. along the movable conductor will act in the direction of the arrow marked E (Fig. 1).

Let L be the length in centimetres of that part of the movable conductor which lies between the long copper bars, and let the velocity of the conductor at any instant be equal to V centimetres per second. Then in a short time t the conductor will move through a distance Vt from left to right, and the area of the conducting circuit will be increased by $Vt \times L$ square centimetres, so that the increase in the number of lines of force passing through the circuit will be equal to $BLVt$. This increase has occurred in the time t. Thus the *rate* of increase (that is, the increase per second) in the number of lines of force threading the circuit is equal to BLV. This gives us the E.M.F. round the circuit in C.G.S. units. In volts, the E.M.F. is equal to $BLV\ 10^{-8}$.

It may be noticed that, for the motion of the conductor to include fresh lines of force in the circuit, these lines must be *cut* by the conductor. *Thus* BLV *gives the rate at which lines of force are being cut by the movable conductor.*

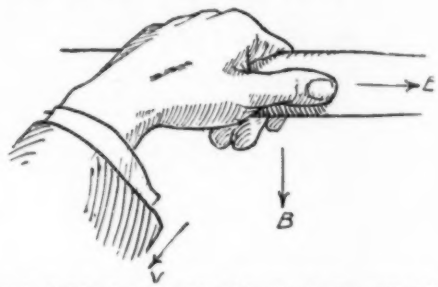

Fig. 2.—Left-hand rule, for determining the direction of the E.M.F. of a conductor when moved so as to cut lines of force.

Left-Hand Rule.—In applying the results here deduced to the explanation of a dynamo, the following rule will be of service:—To find the direction of the E.M.F. induced in a conductor, moving at right angles to its length, so as to cut magnetic lines of force at right angles: Imagine that you grasp the conductor with the left hand, so as to pull it in the direction of its motion, and so that the fingers, extended at right angles to the direction of the arm, point along the positive direction of the lines of force (Fig. 2). Then the thumb, extended along the conductor, will indicate the direction of the induced E.M.F.

Force acting on Conductor carrying an Electric Current in a Magnetic Field.—The current produced in the closed circuit considered above will depend not only on the induced E.M.F., but also on the resistance of the circuit, in accordance with Ohm's law. Let us suppose that the current produced is equal to C, whilst the E.M.F. in the circuit, due to the motion of the conductor, is equal to E. Both E and C are supposed to be measured in C.G.S. units. Then, by definition, the work done per second is equal to EC. In the simple case considered, this work is utilised in heating the copper of the conducting circuit.

By the law of the conservation of energy, an equal amount of work must be performed by the agent moving the conductor. For this to be so, there must be a mechanical force which opposes the motion of the conductor, and the work is performed in overcoming this force.

Let F be the magnitude of the opposing force per unit length of the movable conductor. Then the total opposing force on the conductor is equal to FL, and this is overcome through a distance V in one second. Then

$$FLV = EC = (BLV)C.$$
$$\therefore F = BC.$$

Now the value of F depends only on B, the number of magnetic lines of force per unit area, and C, the current carried by the conductor. Consequently, if the conductor is stationary, and a current C, produced by any external agency such as a battery, flows along it in the direction of E (Fig. 1), the force on the conductor will be equal to FL = BLC, and will act in a direction opposite to the arrow marked V.

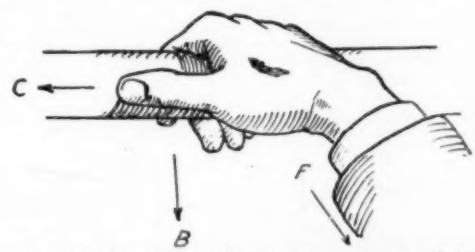

Fig. 3.—Right-hand rule, for determining the force on a conductor carrying a current, when placed in a magnetic field.

Right-Hand Rule.—To find the direction of the force acting on a conductor carrying a current, when placed at right angles to the lines of force of an independent magnetic field: Imagine

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that you grasp the conductor with the right hand, the thumb being extended along it so as to point in the direction in which the current flows, whilst the fingers, extended at right angles to the direction of the arm, point along the lines of force of the magnetic field. Then the direction of the mechanical force on the conductor is that in which the conductor would be pulled by your arm.

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In the *equation of impulse and momentum*, or $Ft = m(v - v_1)$ . . . (1), the force F is described as a constant or average force, the latter in the case of a blow where the magnitude of F varies from zero to a maximum value. When sufficient data are given, the numerical value of F can be obtained in absolute units, or, dividing by g, in gravitation units.

When Equation (1) is familiar, it will at once be seen that, in the data of any given numerical example, the time of action must be known before the magnitude of the force can be obtained.

The following simple example may serve to render the matter clearer:—

Ex. 1. A hammer weighing 30 lbs. strikes a chisel. Assuming the velocity of the hammer at the instant the blow is struck to be 10 ft. per sec., find the force exerted.

Here the data given are not sufficient to determine the magnitude of the force; but if, in addition, we know that the time of action, or, in other words, the time in which the momentum is destroyed, is $\frac{1}{10}$ sec., then we have

$$F \times \tfrac{1}{10} = 30 \times 10.$$
$$\therefore F = 30000 \text{ poundals.}$$

To obtain F in lbs., it is only necessary to divide the number of poundals by g. When the initial velocity of a body is zero, or the body starts from rest, from Equation (1) we get

$$Ft = mv \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (2).$$

Assuming F to be a constant force, and the time to be one second, then, as change in velocity per unit time is acceleration, we at once obtain from (1)

$$F = ma \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (3).$$

This also gives a measure of force—that is, by the acceleration it will produce in a body of mass m.

Again, we may, if necessary, obtain Equation (2) by multiplying both sides of Equation (3) by t.

One of the most useful forms in which Equation (3) may be written is $a = \frac{F}{m}$, or acceleration $= \frac{\text{force causing motion}}{\text{mass moved}}$.

If we denote a small increment of time by δt, and by δs and δv we denote small increments of space and velocity respectively, then from (1) we have—

$$F = m\frac{\delta v}{\delta t} = m\frac{\delta^2 s}{\delta t^2}.$$

We may also readily obtain another important relation as follows:—

The work done by a force F, acting through a space δs, is $F\delta s$.

$$\therefore F\delta s = m\frac{\delta v}{\delta t}\delta s. \quad \text{But } \frac{\delta s}{\delta t} = v.$$
$$\therefore F\delta s = mv\delta v.$$
$$\text{Hence } Fs = \tfrac{1}{2}mv^2 + C.$$

If the body started from rest—that is, if, when $s = 0$, $v = 0$—then C is 0, and we obtain the equation

$$Fs = \tfrac{1}{2}mv^2 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (5).$$

The quantity $\frac{1}{2}mv^2$ is usually called the *kinetic energy* of a body. To the product Fs various names are applied, such as *potential energy, position energy, space action of a force, work done by a force.* It is possible to obtain Equation (4) in what may be termed a more elementary manner, as follows:—

Assuming F to denote a constant force, then if, as before, v_1 is the initial velocity of the body, and v the final velocity, the average velocity will be $\frac{v + v_1}{2}$.

From the relation average velocity × time = space, we get—

$$\frac{v + v_1}{2}t = s,$$
$$\text{or } \frac{s}{t} = \frac{v + v_1}{2}.$$

Multiplying this into Equation (1), we obtain—

$$Fs = \tfrac{1}{2}m(v^2 - v_1^2);$$

and this, when v_1 is 0, gives Equation (3).

In addition to the equations referred to, it is also important to be able to readily use the three equations—

$$v = V + at, \; s = Vt + \tfrac{1}{2}at^2, \text{ and } v^2 = V^2 + 2as.$$

A student may reasonably be assumed to be familiar with the three equations just referred to, and also with the fact that a minus sign may in each case replace the plus sign.

It serves, however, as a useful exercise to those who are acquainted with elementary notions of the calculus, to use it in obtaining the equations. Thus, using the same letters as before, we have—

$$\frac{d^2s}{dt^2} = a. \quad \therefore \frac{ds}{dt} \text{ or } v = at + C.$$

If, when t is 0, the velocity is V, then C = V.

$$\therefore v = V + at.$$

If, when $t = 0$, $v = 0$, then C = 0, and $v = at$.

$$\text{Again, } \frac{ds}{dt} = V + at.$$
$$\therefore s = Vt + \tfrac{1}{2}at^2 + C.$$

When t is 0, V is 0. $\therefore$ C = 0.

$$\text{Hence } s = Vt + \tfrac{1}{2}at^2.$$

As a special and important case, if we write in each equation in which it occurs g for a, we obtain the well-known relations for falling bodies.

A description of the *Atwood machine*, together with its application to determine the numerical value of the constant g, should be obtained from any text-book on the subject; and although simpler, more direct, and more accurate methods of measuring the value of g are now used, the machine is interesting from the fact that the acceleration produced by a *small and known fraction of g* can be measured. Thus, if P and Q are two weights (P greater than Q), connected by a flexible and inextensible cord which passes over a smooth point or pulley, and if T denote the tension in the cord, the forces acting on one side are P − T, and on the other T − Q.

From the relation, acceleration $= \frac{\text{force causing motion}}{\text{mass moved}}$, we have

$$a = \frac{P - T}{\frac{P}{g}};$$
$$\text{and, similarly, } a = \frac{T - Q}{\frac{Q}{g}}.$$

If we eliminate T from these two equations, we obtain—

$$a = \frac{P - Q}{P + Q}g \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (6).$$

And if a is eliminated, then

$$T = \frac{2PQ}{P + Q} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (7).$$

If one of the weights, such as Q, rest on a smooth horizontal table, and if, as before, T denote the tension in the cord, then

$$a = \frac{P - T}{\frac{P}{g}}, \text{ and } a = \frac{T}{\frac{Q}{g}}.$$

As before, eliminating T and a, we get—

$$a = \frac{P}{P + Q}g,$$
$$\text{and } T = \frac{PQ}{P + Q}.$$

(To be continued.)

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THE EDITOR'S TABLE

RECENTLY-ISSUED FRENCH BOOKS.

MODERN language manuals may usually be classified in three categories, which we will call the old, the hybrid, and the new. Some cling tenaciously to superseded ideas and obsolete methods; some appear to be the work of timid reformers, or of those who have only partially assimilated the new methods; and others boldly and frankly adopt the drastic reforms of the leading Continental pedagogues—that is, they follow the direct method, by which we understand the plan of teaching the pupil to speak and write the foreign language by direct association of the spoken or written sign with the thing signified, and without the medium of the mother tongue. The set of books before us may be thus arranged.

We take up Part I. of *The Wellington College Grammar*—Accidence and Minor Syntax—published by David Nutt. The arrangement is lucid, the various kinds of type employed aid the eye greatly, and there are numerous comparisons with the Latin. The amount of detail is enormous, and a teacher who has imbibed modern ideas would probably only use this work as a reference book for advanced pupils who can already speak, read, and write French fairly well. He would certainly never think of dragging unwilling boys through this bewildering maze of rule and exception, of exhaustive lists and exhausting tables, with the added terror of the accompanying exercises. That would be the line adopted by the conservative pedagogue working in the old classical groove. The grammar is an excellent one of its kind.

In the matter of pronunciation, too, we find a work which is constructed on the old lines—*French Pronunciation Exemplified by English Phonetics*, published by Thomas Murby. The new plan, which appears to have penetrated into almost all the best language manuals, is to indicate the French sounds systematically by means of the alphabet of the International Phonetic Association. These descriptive symbols are in many cases a decided help in enabling the learner to form a correct *idea* of the unfamiliar sound, and to recall it when the living teacher is absent. Another aid in acquiring foreign pronunciation is the phonograph, to which we shall allude again. But when English spelling is employed, the pupil can scarcely avoid forming the atrocious habit of speaking French with an absolutely English accent. "Frangssay, parlay-voo, taymoheng, beeaing," are combinations which immediately disgust the teacher who has tried the phonograph or the international alphabet. The broad *ay*, so common in London and its neighbourhood; the English *oo*, which is often quite unlike the French *ou;* the impossible *ng*, which, when made to do duty for the French nasal vowels, reduces an elegant language to the most awesome cacophony, are quite sufficient to condemn this clumsy system. We cannot discover the *raison d'être* of this book.

Turning to M'Dougall's *Preparatory French*, we find characteristics of both old and new methods. The French-English vocabulary, and the practice of translation into French, should now be things of the past, so far as beginners are concerned. On the other hand, the connected narratives founded upon the pictures are excellently done, and should be quite sufficient to win numerous friends for this useful and attractive little work.

The Practical Sound and Sight Method, Part II. (Swan Sonnenschein and Co.), embodies the new ideas, with the exception that the inevitable translation is introduced, although the book is evidently designed for young pupils. The French object lessons are excellent, and form the main feature of the book. The "grammar" consists largely of well-grouped examples, and the only parts of the verb taken are the past indefinite and the future. Many of the exercises consist in framing suitable French answers to the French questions given, or *vice versâ*. It should prove a useful and successful little book, the get-up of which may perhaps be improved in future editions.

Moffatt and Paige's *French Course* claims to be an attempt at "a more rational method than that in vogue in our public schools;" so that our author has not attempted anything very arduous. The book is a great improvement on the old grammar-rule-and-exercise drill; but allusion is made to the fact that the schoolmaster is fettered by examinations, and must therefore train his little pupils to answer grammar papers. Accordingly, the writer has adopted a grammatical arrangement, and presumably it is also with a view to impending examinations that passages for translation into French have been included. This sort of thing recurs again and again in prefaces, and the crying need in England appears now to be, not so much the reform of language *teaching* as the reform of examinations that worry and impede the progressive teacher, and the reformation or conversion of unprogressive examiners who bar his way. The author of the book before us seems to have an inkling of the inductive principles of the new method, "Learn the language, and the language will teach you the rules." But he does not go very far on the road to reform. He teaches the main essentials of French grammar and idiom by means of a dual arrangement of well-chosen examples. For those who are afraid to adopt the direct method, this French course will be a valuable aid.

The *Cortina Method* claims to impart a knowledge of the French language in twenty lessons. But we must say at once that these lessons are long ones, for they cover over three hundred pages. They appear to be designed specially for the private student, and the subject-matter ranges from easy dialogues to talks on French literature and philosophy. Grammar and verb practice are interspersed, and the pronunciation is everywhere indicated in the old-fashioned way by means of English spelling—for example, travail = travà'eey'. We pity the solitary student who endeavours to acquire French pronunciation in this manner—unless, indeed, the publishers can supply him with phonograph and records. Or, after a course of lessons on the French sounds from a competent teacher, an intelligent student would doubtless find this work a good substitute for a professor, on account of its carefully-planned vocabularies, its literal and free translations, and its abundant footnotes. The learner should, however, always regard translation as a crutch, to be cast aside as speedily as possible. Every passage should be read and re-read in the original, until the meaning reaches the mind direct. This work has reached its fifth edition, and appears to enjoy a considerable reputation on the other side of the Atlantic; but, for school use at least, it cannot be said to compare favourably with the latest manuals of the direct method.

Parlons Français, published by Blackie and Son, is another conversational course, in which interlinear work and the dual arrangement—French with English translation opposite—figure largely. "Learn to speak and understand French, then grammar will have its turn," says the author in his preface; and he certainly supplies a vast and varied mass of material for French conversation. The drill to French commands is a sound and valuable idea. The grammatical part is remarkable for its abundance of examples, which incorporate the recent "tolerations." With regard to method, the work is a hybrid. It includes imbecile, incoherent exercises of the old type: "Has Gertrude a little dog? Yes, she has a pretty little dog. The nation is at war." And yet, in the emphasis which the author lays upon the actual use of the spoken language, he is in harmony

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Even in the case of a French reading book, the difference between the old and the new system is plainly marked. In the latter, the notes and vocabulary would be entirely in French, and idioms and difficult passages would also be explained in the language under study. In *Advanced Unseens*, a reader published by Longmans, we find the old arrangement—that is, the notes are given in English; the idioms are elucidated by means of their English equivalents, which are often somewhat misleading; and the vocabulary, as usual, follows the arrangement of a French-English dictionary. It is an inviting collection of extracts, drawn almost exclusively from modern authors, and in this the compiler follows the new principles. Although it is admitted in the preface that readers of unseens "are not considered to be concerned with pronunciation," the silent letters are indicated by means of italics, and this simple but useful device shows that the author has a longing for better things than French taught without pronunciation. There is a special edition for teachers, which contains about twenty pages of additional notes, with an index. The book would be greatly improved if the extracts were arranged upon some definite plan, instead of being presented to the pupil as a jumble of passages from the writings of critics, historians, and novelists, in which we find jostling one another the representatives of diametrically opposed schools. It seems strange, for example, to see Victor Hugo rubbing shoulders with Zola. We can heartily recommend this book as a collection of interesting and attractive reading matter.

Voltaire: Contes et Mélanges, published by A. and C. Black, is an excellent French reader, arranged upon the modern plan described above. We welcome this as an able attempt to adapt a reading book to the needs of the progressive teacher who has left the old grammar-and-translation method behind him. The life of Voltaire is given in French, and that is as it should be. The French notes for conversational teaching are admirable, and furnish useful assistance to the teacher who does not yet feel quite at home in the difficult direct method. Objects, maps, pictures, and word-grouping are skilfully employed in the French oral exercises. We would advise the author to be consistent and rewrite the six pages of English notes in simple, suggestive French. The subject-matter of this book is so interesting that we have dipped into it deeply. The arrival of Candide in England, and the whimsical French version of the execution of Admiral Byng, are good examples of Voltaire's piquant, fascinating style. We can heartily recommend this book as an excellent up-to-date French reader.

For little learners there can scarcely be anything more enticing than *The French Picture Primers*, published by Blackie and Son. The teacher who believes that well begun is half done, and who wishes to present the new subject in the most alluring manner possible, has here the right means. The first primer contains about a hundred and twenty little pictures, coupled with French names, phrases, and sentences. The second presents about thirty-two pictures, and the old material is worked up with the new into longer descriptions. We note that the author has not yet ventured to write the vocabulary entirely in French, as many recent reformers do; yet she appears to possess the necessary skill. We hope that these admirable little books will be widely used; they ought to make the little ones very happy over their French lessons.

The Pictorial French Course, published by the Modern Language Press, is a manual written according to the principles of the direct method, with the additional advantage that the phonograph is called in to aid the solitary learner. The numerous pictures are not very artistic, but that is a detail. They are rendered clear by reference numbers, which connect them closely to the French description. With phonograph, picture, and French text to aid him, the veriest dullard will surely be able to learn the language readily. The book contains grammar lessons, and explanations are also given in English. The author alludes to the utter inadequacy of the so-called imitated pronunciation—the awkward attempt to teach French sounds by means of English spelling. We entirely agree with him; but, on the other hand, the importance of the phonograph as an aid in language study must not be exaggerated. It is with hearing as with seeing: we have to learn to see and hear with the *mind* as well as with eye and ear. Many people retain their native accent after long years of residence on the Continent, simply because their perceptions are not sufficiently refined to catch subtle differences of sound. In fact, unless the pupil acquires the correct *notion* of the foreign sound, he cannot correctly imitate either the endless iteration of the phonograph or the voice of the living teacher. It is in this psychological process of *Begriffsbildung* that descriptive phonetic symbols and careful study of the organs of speech prove so useful for the slower kind of pupil. With this necessary limitation, we welcome this French course, as marking another advance in language teaching.

Lastly, we turn to Whitaker's *First French Book*, and at once find that the authors are "in the swim," in the strong current of language reform, which we hope will gain force enough to sweep entirely away the worm-eaten, dry-rotted, tottering timbers of the old method. The writers have evidently drawn inspiration from the works of Alge, Rossmann and Schmidt, Vietor, and others to whom we have often alluded in these pages. The symbols of the International Phonetic Association are employed as aids to correct pronunciation, and the teacher who adopts them will soon recognise their value, in communicating to the learner the correct idea of the foreign sound, and also as reminders which will suggest the half-forgotten sound to his memory. The work contains full notes for the guidance of the teacher, phonetic transcriptions of some of the lessons, and, strange to say, exercises of the old type for translation into French. We cannot imagine what these are doing here. The only possible explanation is that we Britons are incapable of sweeping reforms, and must always, with sweet inconsistency, retain some relic of the obsolete embedded in the new. It is what a French writer terms "l'inaptitude relative de la race britannique à concevoir les idées générales." The pictures are numerous, but not remarkable as works of art. Doubtless, however, this book and others of its type will become more and more widely and successfully used as the direct method wins more adherents; then each new edition will probably bring improvement in the illustrations. In Germany the new method is now firmly established; and soon, even in slow, conservative old England, the ancient grammar-and-exercise system will be as extinct as the ichthyosaurus, and found only in a fossilised condition in certain "academies for young gentlemen."

WILLIAM BLACKWOOD AND SONS.

A Spanish Grammar. As students do not usually take up Spanish until after mastering at least French, the question of method is not so important as in the case of beginners attacking their first foreign language. We therefore have no hesitation in recommending this grammar as a useful self-contained book, which supplies the learner with rules, exercises, and his first easy readings, and which can be used as a companion to his further reading; for reading, after all, is the best way to grasp the grammatical principles of a language. The proverbs given are often very idiomatic, and should not be left without explanation. A comparison of Spanish words with Latin or French would in many cases be a great aid to the memory. For example, *llamar*, *llano*, *llave*, *lleno*, *llorar*, *llover*, are all quite easy when the letter-change has been mastered. The readings are excellent, and so arranged that the meaning should be almost self-evident even to the beginner.

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Elementary Object Lessons in German. This book supplies the teacher with the right kind of commencement, which in the case of German is an all-important matter. The beginnings in this subject so often repel and disgust the little learner, that we welcome this book as a means of brightening up the study of German, which ought to be much more widely cultivated in England than is the case at present. The book consists mainly of pleasant childish chats about the pictures. Used with Nelson's Wall Sheets, it cannot fail to make the work pleasant.

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Interlinear German Reading Book. By E. Hahn. This book, as its title implies, contains a literal English translation, on the Hamiltonian system, of stories by well-known German authors, progressively arranged. If rightly used, the interlinear method should prove distinctly helpful to the private student, and we commend to the notice of our readers this really capital selection of interesting stories, which are clearly translated line by line, with the addition of a number of serviceable notes.

ALLMAN AND SON, LIMITED.

Julius Cæsar. By J. Lees, B.A. This is in all respects a thoroughly good edition for school use of one of the best of Shakespeare's plays. The introductory notes and the analyses of the characters of the chief *dramatis personæ* are very helpful. The notes on the text are clear and sufficient. The greatest care is evinced to make the student understand and appreciate the play, and this, we take it, should be the first aim of the editor of a school edition.

The Metric System in Theory and Practice. By S. Jackson, M.A. Pp. xii + 99. The main defect of such books is that they are too big. Here is a vast reform, the introduction of which would save half a year of every English boy's mental life, and might do something to arrest the apparently increasing decline of our trade—a reform every item of which can be intelligently explained on a single sheet of notepaper; and Mr. Hamblin Smith takes 103 pages for the purpose, Mr. Arnold Foster 150, Mr. Delbos 136, and Mr. Jackson 99. All this is scarcely likely to commend the change to our business men. Mr. Jackson's present book does not suffer, as did his *Commercial Arithmetic* (Macmillan), from a scourge of many-figured decimals. The worst example is where he figures out the weight of a florin as 12·441398 grams, and forgets that no balance could give us the last figure of this number correctly. On the whole, the work is well and carefully done. There is slight inconsistency in the naming of the foreign coins—perhaps this could scarcely be avoided; "kroners," for instance, is a double plural of a barbarous kind. There is also a quaint kind of humour in the hint that if England adopted a decimal coinage, "the lowest silver coin available for offertories would be the cent (2·4d.)." It thus becomes sadly manifest that if decimal coinage were adopted, the incomes of the churches would fall 20 per cent. Will this have the result of setting the church against this scientific reform?

Text-Book of Elementary Botany. By Charlotte L. Laurie. This book is intended more especially for those preparing for the junior Oxford and Cambridge examinations. A careful perusal of its contents shows that it is not a mere cram book of dry facts written solely for examination purposes, but a successful attempt to place before beginners the chief elementary facts of botany in an interesting manner. The book opens with the germinating seed, and a practical turn is at once given to the instruction by showing how numerous interesting little experiments may be performed. Indeed, the practical experimental work is one of its features. The functions of different parts of the plant, and the relations of the plant to the soil and the air, are excellently treated. In these chapters, as well as those on germination, roots, buds, and leaves, teachers may find abundant materials for a most interesting series of object lessons from plants for the upper standards.

Chap. x., which deals with the formation of the seed, is the least satisfactory. We are told in the preface that, as far as possible, technical language has been avoided. Whether or not the attempt has been successful, our readers may judge from the following extract:—"As the ovule develops, a macrospore or embryo sac is formed in the sporangium; from the macrospore the oösphere arises, and until this has been formed, the ovule is not ready for fertilisation. When the oösphere is ready, the contents of the microspore or pollen grain.....unite with the oösphere."

On page 31 we find, "Compound leaves are either pinnate or digitate (Fig. 29);" and on turning to the figure named we find, "*Palmate* leaf of lupin." Also, on page 74, "In dicotyledons the floral leaves in each whorl may be two, four, or five, *never* three." The lesser celandine, with its three sepals and (often) nine petals, must have been overlooked. The floral formula on page 45—P 3 + 3 A 3 + 3 G 3—is at first sight confusing. It would be better in future editions to either print the figures smaller and a little below the letters, or else to insert commas before A and G.

There are one or two notable omissions. No mention is made of the cambium ring, and though growth in thickness of the wood is mentioned, it cannot properly be explained without some description of the cambium layer. Nothing is said of *vessels* and their function beyond an experiment on page 116 which shows that water passes up "certain threads or strands."

The illustrations are numerous and exceedingly good. The authoress has been fortunate in securing the assistance of one who combines botanical knowledge with artistic skill.

The book is neatly bound, well printed on good paper, and no expense has been spared in reproducing the really excellent drawings.

THE AMERICAN SCHOOL AND COLLEGE TEXT-BOOK AGENCY.

An Elementary Physics for Secondary Schools. By C. B. Thwing, Ph.D. This book, which is, as its title implies, arranged to meet the requirements of students in secondary schools, consists of two parts—the first part dealing with general principles, and the second with laboratory exercises. Those using the book are advised to read a section in Part I., and at once proceed with the experiments dealing with that section.

This seems to be an admirable arrangement, and will, at any rate, ensure that a student cannot carry out an experiment without understanding the why and the wherefore of what he is doing. Experience in classes can alone decide whether such a scheme can be successfully carried out.

The experiments are very instructive, are well arranged, and the apparatus required is, on the whole, simple and easily obtainable.

It is impossible to give a clear outline of the contents of the book. Owing, no doubt, to faulty binding, pages 81 to 96 have been substituted for pages 225 to 240. This being the case, we can only infer from the table of contents or from the index what is to be found in the missing pages.

GEORGE BELL AND SONS.

Billy and Hans: A True History. By W. J. Stillman. Alas that to the name of Mr. Stillman, one of the truest and wisest of the friends of animals, we must now prefix the sad word *late!* His observations of lower life have been so accurate, his deductions therefrom so philosophic, and his delineations so graphic, that by his death literature as well as humanity has lost an exponent.

The little book before us, which first appeared as articles in *The Century*, is the life history of two squirrels, reared by the author with all the care that a parent usually gives his children; and the reward was in his learning from them that "life is one and love one, and that the shades and distinctions we make are only the result of alloys of the pure metal." The true humanitarian will regard this conclusion as the sum total of all specific humane teaching.

With regard to the suitability of the little book as a school reader in elementary schools, we are able to say from experience that it is very attractive to an intelligent first class, especially if read with the teacher in the first instance. The National Home-Reading Union, we note, gave it a place on their young people's list two or three years ago. The illustrations, four in number, are delicate pencil drawings by Miss Lisa Stillman.

ADAM AND CHARLES BLACK.

A Treatise on Elementary Statics. By W. J. Dobbs, M.A. This is a well-written treatise on statics, intended for the use of the higher forms in schools and junior classes at the universities. In the earlier chapters there is a clear treatment of those fundamental propositions of statics which can be conveniently dealt with by elementary mathematical methods. Later, chapters on work, machines, and friction are given. A good feature throughout the work is the continual insistence upon the geometrical as well as the analytical treatment of the

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* *In consequence of the Conference of the Froebel Society and Sloyd Association on Saturday, January 18, no classes will be held on that day. Particulars of the Conference may be had from the Secretary.*

subject. This is too often neglected in books on the subject. A considerable number of worked-out examples in which both methods are used will doubtless be of the greatest service to those using the book. In addition, there are numerous exercises provided for practice. These have evidently been carefully selected, and, in addition, seem to be carefully graduated, and the answers to these are given.

Although perhaps comparatively unimportant, it seems desirable to call attention to the misuse of the word "power." Thus, when dealing with the simple machines, the two forces acting are designated as the power and the weight. The student already familiar with elementary notions of dynamics is aware that the word "power" usually denotes "rate of doing work;" and to use the word when many others, such as "force," "effort," etc., are available, seems not only to be quite unnecessary, but, in addition, likely to lead to mistakes. The illustrations and text are alike excellent.

BURNS AND OATES.

Practical Plane and Solid Geometry. By J. Carroll. The title-page gives this as the *forty-sixth edition*. We can only say, from an intimate working knowledge of the book, that it is worthy of it. For clearness and accuracy of working it cannot be surpassed. To bring it up to date, a chapter has now been added on mouldings, arches, and the geometrical construction of pattern work. .

CHAPMAN AND HALL.

Anticipations of the Reaction of Mechanical and Scientific Progress upon Human Life and Thought. By H. G. Wells, author of *Love and Mr. Lewisham*, *The Island of Dr. Moreau*, and *Tales of Space and Time*. Constructive imagination is needed for a work of science no less than for a work of fiction, if the science is to be really a scientific investigation and enunciation of natural law, and not a mere enumeration of natural facts. A novelist may be essentially a photographer rather than a painter, and may content himself with touching up the foreground and transferring a sky in order to turn the work of his camera into the work of his brain. The scientist has no such escape from labour. Experiment or observation merely recorded are good enough as data for science, but are not yet science. The interpretation of nature's hieroglyphs is what the scientist must seek and must find. In the work before us Mr. Wells has turned scientist. He has set himself to interpret the mechanical and social forces at work at the close of the nineteenth century, and from his analysis to anticipate the further development of these forces during the twentieth century. In the earlier part of the work he is conspicuously successful—that is, his grasp of the present and of the recent past is strong, and his anticipations are made to present themselves as inevitable results of forces now active. His chapters on war and on language also carry conviction. In dealing with political questions less force is shown. His analysis of the actual is not such as to give confidence in his forecast of the probable. We are reminded of a sentence on the first page of the book, "Hitherto such forecasts have been presented almost invariably in the form of fiction, and commonly the provocation of the satirical opportunity has been too much for the writer," and we feel that this provocation is apt to be too much for the writer even of a work which is not one of fiction. His forecast of "Faith, Morals, and Public Policy" also leaves something to be desired. How is it that the morals of every ideal society are apt to be so very uninviting, from the Platonic Republic downwards? Perhaps it is only another illustration of the prejudice of the average reader. If required to choose between the old Greek and our present writer, we should decline to pledge our vote till we had very carefully re-read their manifestoes. At any rate, one feels that though the end-of-the-twentieth-century society will have learned something from our blunders, we shall not miss much by being "out of it," if we are to trust Mr. Wells.

The book is, however, a remarkable one, and remarkable in achievement as well as in aim, and our mild criticism is not to be taken as indicating a contrary opinion. The aim is remarkable for its width and boldness. To write an account of the nineteenth century under the same aspects, where there are facts to guide one, would be a formidable task. To forecast the present century's progress, where only tendencies can as yet be perceived, is a task which only the boldest would face. Our author has done it, and done it well, so far as the present generation can judge him. In the meantime, he is safe from the contradiction of any facts that may yet emerge to upset his calculations.

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It is a perfectly safe thing to say that no school, however poor in funds it may be, can afford to be without some of the pictures that are now so largely issued by publishing firms. Not only do they add beauty to the school, but by using them as subjects for conversational lessons their value is enhanced. The Religious Tract Society sends us two Scripture cartoons. They form Nos. 30 and 31 of a series of pictures illustrating scenes from Holy Writ. No. 30 represents Jesus setting a little child in the midst of an assembly of older folk, and drawing therefrom the lesson of Humility. No. 31 is a representation of the Nativity. Both are printed in bold outline and colours. They are true to Eastern life and scenery, and cannot fail to be exceedingly helpful in teaching. They may be had in varying styles and prices, from 1s. 4d. each on paper to 7s. each on linen, stretched and varnished.—Thomas Nelson and Sons add to their "Royal Portfolio, Geographical Series," an animated picture in colours of *Cape Town and Table Mountain*. This is an admirable set of illustrations suggesting points to the teacher which cannot be got from a text-book, and which might otherwise be neglected. Each picture is indeed an instructive geography lesson in itself. —We have noticed before the "Fitzroy Pictures," published by George Bell and Sons, and we have pleasure in drawing attention to the issue of *The Months*. We cannot speak too highly of these four beautifully drawn and coloured pictures, the work of Heywood Sumner. They represent typical scenes of farm, home, and country life in each of the months, and for wall decoration they are much above the average picture, while for instruction they are most valuable. Issued with the pictures are appropriate verses and old-fashioned sayings calculated to impress Nature's work during the months on the minds of even the youngest children. Considering the high-class style of the pictures, they are not dear at 10s. the set of four. There are three pictures on each plate.—W. and A. K. Johnston have made their set of pictures for conversational lessons more complete by adding the following: *The Lamplighter*, *The Story Hour*, *Sick Children's Hospital*, *The Policeman*, *The Breakfast-Table*, *The Shoeblack*, and *The Costermonger*. They are each highly coloured with bold outline, so that they can easily be seen by a good-sized class. Oral and written composition are sure to be improved in the schools where they are adopted; and inasmuch as a hand-and-finger game is described at the foot of the pictures, they can be used as low as the babies' class in the infant school. We cordially recommend their adoption.

NEW GIFT-BOOKS.

BLACKIE AND SON.

Terrie's Travels. By Jennie Chappell. This is the adventures of a small five-year-old in search of his "Daddy in Tokio." Very exciting are Terrie's travels, and as he is a well-mannered and trustful little boy, we take him to our hearts at once. Little ones will read this story with interest, but we doubt whether such thrilling adventures for such very small boys will prove wholesome reading.

The Dragon of Pekin, a story of the Boxer revolt, by Captain F. S. Brereton, is a thrilling tale of hairbreadth escapes and gallant adventures, regulating the breath of the reader until, almost gasping, he is in at the death of Sung, at once the leader of the "Fist of Righteous Harmony Society" and the private enemy of the hero's father. The personal interest in Sung illuminates state affairs, and the book is ideal in that it is most instructive without being at all obtrusively so. Chinese character, the history of China ancient and modern, and the scenery of the Yang-tse-kiang are treated in a way which gives much educative value to the book. Bob Duncan is the best type of British boy—clever, doggedly brave, and reverent withal. He can murmur a prayer in a crisis; and his romantic meeting with Eva Mannering, who is disguised as a Chinese coolie, gives an English colour-tone to a picture in which Chinese red and yellow take up most of the canvas. The book is excellent reading of history in the making, and closing the book, one really feels that the defence of the Legations at Pekin was equal to that of Rorke's Drift.

In the Dictator's Grip, by John Samson, is, according to the preface, a true account of a little-known period of South American history, written in the form of fiction. Clearly the fiction is but a slight assumption; it is not until page 205 that the Dictator is mentioned, and then, of course, there is not

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enough room for that elaboration of detail in dealing with the incidents which group themselves around him to vindicate the title of the book. The book opens at a crisis in the life of Stephen Herrick. Steve has always wished to win laurels in the naval service, and, tired of monotonous turnip-hoeing, he makes definite plans for going to sea. He achieves his end, and then the reader's interest in him flags somewhat, for the book becomes a history of South America. Matters political and ethnographical absorb the reader, and the existence of Stephen is at times the only connection between the parts of the book. Doubtless the didactic speeches of Don Antonio will pall on a schoolboy; and the book, though marshalling an interesting array of historical facts, cannot on the whole be said to have "grip." It is too rapid, and contains too much matter for its bulk. The after history of men of the time is given in parentheses, which readers of *In the Dictator's Grip* have a right to resent.

W. AND R. CHAMBERS.

Cosy Corner. By L. T. Meade. This book is attractively got up, and the illustrations are charming; but the story itself is unreal, and children would glean false notions of life from it. Good parents do not leave four tenderly-nurtured children to their own devices for months together, and acquaint them with their money troubles. It is certainly improbable that the four children, even under the skilful management of the fourteen-year-old Claudia, could take a cottage and sell fruit and vegetables, keep bees and calves, and make money by serving bicycle travellers with tea. The villain of the story, who is pressing the unfortunate father for money, takes tea at the children's cottage, and is so touched by their devotion that he repents, and showers blessings on the family. So all ends well; but one wonders how such weak parents become possessed of four such charming and resourceful children.

Girls of the True Blue. By L. T. Meade. Nan is an over-strained and somewhat sentimental little girl, and Augusta is a fiend. Girls of fifteen do not, as a rule, develop such cunning and malignity as that shown by Augusta towards the simple and unfortunate Nan. The uncle is supposed to be a delightful person, but his methods are elaborate and sentimental. Mrs. Richmond, as a sensible and kindly woman and mother, ought to have seen through Augusta and understood Nan. Grown-up people, especially women, are not so stupid as the children's stories would have us believe. The nature of Nan's relationship to Mrs. Richmond and the Asprays is feeble and romantic.

Courage and Conflict. By various authors. Boys will find this to be a most attractive volume, seeing that it contains eighteen stories by some of their favourite authors. For instance, the list of writers includes the names of Henty, Manville Fenn, Bullen, Whishaw, and others; and the scenes of the tales are in America, Australia, China, Africa, as well as in England, Ireland, and Scotland, and in other parts of the world. And as though these stories were not enough, there are eight excellent illustrations by W. Boucher.

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The Men of the Backwoods. True Stories and Sketches of the Indians and Indian Fighters. By Ascott R. Hope. Illustrated by C. C. Murray. This book is replete with stories of thrilling interest. The period is that of the American War of Independence, when, to our shame be it spoken, England employed the Redskins against her own sons. These wondrous tales of personal prowess read like the deeds of classic heroes, and it is difficult to realise that the actors in these wild scenes of strife may have been personally known to many now living. It is needless to say that the book will delight most boys.

A Troublesome Godchild, by Mary E. Mills, is a cleverly-written book. Its chief incidents are the heroine Kathleen's introduction to her godmother, whom she never remembers having seen, her meeting with Bryan at her godmother's house, her entrance into a large girls' school, and, lastly, her marriage with Bryan—all of which incidents are described in a bright and original style, many of the conversations being very witty. The meeting of the literary club at the girls' school is delightfully comic, and will excite many a peal of laughter. The schoolgirl to whom this tale falls as a prize may certainly consider herself favoured by fortune.

HACHETTE ET CIE.

In good time for the Christmas season, Messrs. Hachette, the well-known publishers of Paris and London, have issued their illustrated catalogue of *Livres d'Etrennes*. Teachers, students, and others in search of a good selection of volumes in French for presentation, cannot do better than send to Messrs. Hachette, King William Street, Charing Cross, for a copy of this catalogue of the newest illustrated publications. The published prices range from the lowest to the highest, and judging from the few specimens submitted to us this year, we are quite sure that if any of our readers will take an early opportunity of examining some of the volumes themselves, they will be more than satisfied with the value offered. Of the annual volumes, the one entitled **Lectures pour Tous** is an exceptionally fine magazine. It contains upwards of eleven hundred illustrated pages, with articles in great variety which appeal to all. It is printed in the best possible style, and the numerous illustrations form a veritable portfolio of art reproductions. Full of the most entertaining letterpress, such a volume cannot fail to give the greatest pleasure to all who read French. Another annual, entitled **Mon Journal,** is especially for children of from eight to twelve years old. This, again, is beautifully produced, with many charmingly-printed coloured illustrations inserted throughout the letterpress. Short stories, long stories, varieties, amusing occupations, musical pieces, comedies for children, etc., go to make up a vast amount of extremely interesting matter for the young folk. The illustrations are for the most part humorous, and will go a long way towards helping the English child to understand the French text. There are also a number of amusing picture pages in colour, described as *histoires sans paroles.*

Two new volumes have been added this year to the *Bibliothèque Rose Illustrée*—**Le Secret des Tilleuls,** by Mme. Chéron de la Bruyère; and **La Tante Picot,** by Mlle. G. Du Planty, each containing a large number of original illustrations.

Almanach Hachette, 1902. The teacher who reads French will find this popular little encyclopædia of practical life most valuable for reference. He may "inquire within upon everything," from the great question of the future of the human race to the anatomy of the spider, from visions of the infinite to the history of the smoker and his pipe. Its five hundred pages are crammed with useful and interesting information.

Le Rubis de Lapérouse. Par G. de Beauregard. An ideal gift-book for the good boy who knows his French well enough to enjoy reading the interesting story. The gilt edges and magnificent binding are by no means the only attractions. Le Comte Roger de Fleurines is moping in his château, weary of monotonous ease and unvarying good luck. A naval lieutenant rouses him up by suggesting an expedition in search of the remains of the famous French navigator Lapérouse. The adventurers set out; but an English commodore is sent with orders to follow the French expedition closely, to forward intelligence of its doings, and to circumvent any attempt to plant the French flag upon new territory. The commodore takes with him his beautiful daughter, and the French count, after manifold adventures, finds the ruby ring of Lapérouse, and also—a fair English bride.

L'Amour Maternel chez les Animaux. Par Ernest Menault. Illustré de 78 vignettes sur bois par A. Mesnel. (Nouvelle Edition.) This forms one of the handsome series of volumes, the *Bibliothèque des Écoles et des Familles,* which are well known for their internal interest and external attractiveness. The subject is treated with a scientific fullness of information, and at the same time with an imaginative spiritualising of the phenomena of provision for and care of offspring which one cannot well describe as scientific. It is very beautiful to interpret the efforts of an insect to provide for the offspring which it will never see as the result of maternal affection, and to the poet such an interpretation may be permissible; it is as a poet, indeed, that we must regard the author in perhaps the larger half of the work. The result is very pleasing in many aspects, and for the young reader it has certain advantages over the merely matter-of-fact treatment. Much information is given regarding the habits of animals, arranged under the headings of Insects, Fishes, Birds, Mammals (Ruminants, Carnivores, etc.), and a large number of illustrative engravings are added.

L'Empereur, L'Impératrice, La Garde Impériale. Série de Découpages. Texte de Aristide Fabre. Illustrations de Job. This is a useful picture book for rainy days. There are ten large coloured plates, with descriptive text. But the plates are not designed to be merely looked at: the figures are to be carefully cut out and mounted as directed, when the result will be a series of historical personages with various costumes which can be put on and off at pleasure. If any teacher wishes to combine the subjects of "French" and "Varied Occupations," here is a unique opportunity! We can recommend the book to the more talented denizens of the nursery, and even to some ex-denizens of it.

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upon Earth. Written anew for children by J. W. Mackail, sometime Fellow of Balliol College, Oxford. This is yet another attempt to tell the gospel story to children, and is in most respects a very successful one. The words of the English version are freely used where suitable, and the whole story is divided into short chapters of about a page in length. The book is a good one to use either in school or at home. This is a class of book where the aim and purpose count for much, and where criticism of style and manner must be made with reluctance. Yet many readers will feel that it is open to serious objection to insert so many chapters of legendary lives and acts of the early Christian saints without any caution or explanation as to difference in authenticity between these and the main story, while several of these legends are wanting in any intrinsic quality which would justify their inclusion in the book. We do not think that a book written for children would have been any the poorer had the author also omitted the story of the woman taken in adultery. In some places the need for brevity has led to obscurity, as, for example, in the explanation of the parable of the Sower, where we read, "The seed that fell by the wayside are they who hear," etc.; and the same error is made throughout this chapter. In other places, the well-known words of the Bible narrative have been needlessly modernised, and not improved thereby, as when "Do not be afraid" is substituted for the simple "Fear not," and again where the exclamations, "We know not where they have laid Him," and "I know not where they have laid Him," are almost vulgarised by the substitution of "We do not know," and "I do not know." The book is well produced as to externals, and will be popular.

THE NATIONAL SOCIETY.

The Waterloo Lass. By Mary H. Debenham. Although boys would find this story interesting, it seems to us to be specially suitable for girls. With much literary skill and charm, the writer reveals for us the daily life of the north country—the life of the squires, farmer-folk, and tinkers of Teesdale, with incidentally a change to the troubled scenes of the Yorkshire towns, at the period of Waterloo, and of the struggle at home against the introduction of machinery into the mills. The authoress loves lonely moors, orchards, flowers, and hills and fields, as well as people, and she has the power to convey to the reader the impressions she has herself received. We have read the story with much pleasure, and can heartily recommend it to mothers and aunts who are looking for an appropriate present for daughter or niece. There are five full-page illustrations by W. S. Stacey. If another edition of the book is issued, the misquotation of Browning on page 40 should be corrected. The use of the word "walked" instead of "marched" takes away from the strength of Browning's lines.

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On Honour: A School and Home Story. By E. D. Adams. This is a thoroughly healthy book, and will be read eagerly by girls. Perhaps the cruelty of the soured aunt to her little orphan nieces is a little exaggerated, but the devotion of the frank-hearted Jimmy and the loyalty of her boy comrade Will make a pleasing relief to the sadder portions of the story. The adventures undertaken by their young friends in order to help Meg and Polly are a little wild, but the book ends well: the wicked aunt reforms, Meg is saved, Polly confesses, and even the ambitious and capable head-mistress softens and becomes almost sympathetic in the end. So poetical justice is satisfied, and the young reader will sigh contentedly at the end, and wish that in real life everything concluded as satisfactorily as in story-book life.

The Cape and its Story; or, The Struggle for South Africa. By the author of *Breaking the Record*. It is good to provide a boy with reading matter that is stirring and thrilling in its narrative; it is better when the narrative is a story carrying with it the history of an epoch or an event; it is best of all, however, when the narrative, being interesting because of the exciting adventures it relates, leads to true, high-souled patriotism. *The Cape and its Story* is a book fulfilling these conditions. With the whole story, ranging from the first landing of white men in South Africa (1496), through all the changes of occupation and possession, to the departure of Mr. Kruger to Europe, the reader, let him be man or boy, is held entranced. He sees the struggle as though he had been on the spot and taken his share in the fray. In about a hundred and ten pages he gets, at the conclusion of the book, an epitome of the present Boer War, in which the events are depicted in a novel historical way. A splendid Christmas present.

Jack Ralston. By Hampden Burnham, M.A. Tropical lands and seas have their romance, but to many the stronger appeal is made by the lands that are covered with snow, and to the seas where the icebergs gleam. It is indeed, as the author of this story has written, "to the bold and daring man, who fears neither Nature nor the hostile native, and who glories in his physical strength and fortitude, that the North presents a weird and uncontrollable fascination which no other part of the earth affords." By the fireside, during this and many subsequent winters, the story of *Jack Ralston* will no doubt thrill many a boy as he reads of these hunts of the walrus, the white bear, the porpoise and the deer, of the trapping and the fishing, and, better still, of the absorbing adventures with Indians and wolves in the far north-east of Canada. Incidentally, much information is imparted about the country and about the habits of the Indians and the Eskimos; and the writer is evidently well acquainted with the kind of life he has described. The binding of the book has been made attractive for boys, without gaudiness, and there is a beautiful coloured frontispiece in addition to a charming vignette, also in colours.

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Logic; or, The Art of Explicit Reasoning. By George H. Smith, author of *Elements of Right and of the Law*, etc. It is refreshing to meet with a writer on logic who still believes in the practical utility of the science or art in daily life. "Of all the branches of learning," says the writer, "I believe it to be of the largest practical utility to man, and that all the learning of the day cannot compensate for its loss; and also that its decadence has been one of the great calamities of mankind." The point of view from which the author surveys the field is that logic is concerned with the matter of thought as well as with its forms and its expression. The only conceivable tests, he says in the introduction, by which the truth or falsity of our beliefs can be determined are experience and reasoning or logic. "Of these, the former is more or less efficiently used by men in general; and in concrete matters, and in the ordinary familiar affairs of life, its operation is moderately satisfactory.....But the function of experience is simply to furnish reason with materials on which to work; and of reasoning, or logic, as Hobbes says, 'so far are the mass of men from using it, that they do not even know what it is.'" The paragraph of which this is the substance is, curiously enough, entitled, "Logic the Ultimate Test or Criterion of Truth,"—which seems to imply that logic has not merely to use the data of experience, but also to pronounce on their validity, its only means of so doing being those data themselves. The scientist may fairly demur to the subsidiary function allocated to experience as distinguished from reasoning, and not in this paragraph alone. The interests of the writer are throughout those of the jurist and moralist, and these aspects of reasoning are treated with more insight and appreciation, even if their relative importance is somewhat exaggerated. The book is, however, most suggestive and stimulating; to those who have already some acquaintance with formal logic, and can thus appreciate fully the changes proposed by the writer, its perusal will form a valuable mental exercise. To those who attempt to reason on political and moral topics without any real acquaintance with logical principles—a very numerous class—the book is likely to be of the highest value.

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